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GRC MILab Software: Quick Start Guide

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Summary

This document provides detailed installation and operating instructions for the GRC MILab Excel Add-In software developed at the NASA Glenn Research Center. The software described has been implemented to facilitate the process of importing into Microsoft Excel and analyzing materials test data from a wide range of materials tests. All resulting data is then ready for automated upload to the relevant table of the GRC Materials Intelligence (MI) database. This new software represents an update to the original MILab software developed by Granta Design Ltd.—a company specializing in materials software, data, and databases—for members of the Materials Data Management Consortium (MDMC), a collaboration between Granta, ASM International, NASA Glenn, and several other materials-oriented corporations and government agencies in the aerospace and defense industries. The updated software consists of the addition of two test type modules, the Generic and Generic Cyclic modules, with both representing a generalization of the original software. The Generic module supports the import and analysis of multiaxial data from any sequence of tensile, compression, relaxation, and/or creep test stages; and the Generic Cyclic module expands the functionality to include repeated sequences during cyclic testing. During processing, all imported data and analysis results are formatted by the software so as to be ready for immediate automated upload to the MI database, ensuring minimal overhead on the part of the user and access to persistent and reliable data for all relevant personnel.

1.0 Overview

The importer templates and Microsoft Excel add-in software, GRC MILab, described in this document have been developed in order to automate the process of importing into Microsoft Excel and analyzing test data from Generic and Generic Cyclic test runs and uploading the resulting data, as well as specimen and any other related data, to the Test Data: Generic table of the Materials Intelligence (MI) database. This new software represents an update to the original MILab software as developed by Granta Design Ltd.—a company specializing in materials software, data, and databases—for members of the Materials Data Management Consortium (MDMC), a collaboration between Granta, ASM International, NASA Glenn Research Center, and several other materials-oriented corporations and government agencies in the aerospace and defense industries. Detailed operating instructions for the original Granta-developed version of the software are provided in the GrantaMI_Lab_StaticDynamic_Instructions_v1.4.4.pdf file (Ref. 1), included in the GRCMILab.zip archive used to distribute this GRC MILab software update, and this document should be considered as a supplement to Reference 1. As such, the information provided herein will focus primarily on that which is unique to the operation of the Generic and Generic Cyclic modules, rather than duplicating information available in Reference 1. Additionally, relevant information resulting from changes to the general operation of the software that have occurred since the original Granta-developed software was released will also be described. The latter includes specifically the method to be used to install the updated software within Excel, which no longer requires the use of a separate installation

program as was the case with the original software. Due to changes implemented by Microsoft, which now limits user access to certain portions of the file system, as well as changes that have impacted other aspects of the prior software installation procedure, the software has now been updated to eliminate the requirement for use of the Granta installation program. Instead, the software can now be entirely installed from within Excel, as will be described in detail in subsequent sections of this document.

In addition to Reference 1, the GRCMILab.zip archive used to distribute the updated Glenn version of the MILab software also contains all files required for use of the new Generic and Generic Cyclic modules, as well as all files implementing functionality for modules that were included in the original Granta-released version of the software. The graphical user interface (GUI) for all modules is contained in the GRC MILAB Analyser 1.4.xla Excel add-in file, with supporting functionality contained in the GRC MILAB Importer 1.4.xla add-in, and Generic and Generic Cyclic importer template functionality implemented in the MILAB_GenericSheetsWS.xlsm and MILAB_GenericWS.xlsm importer template files. The .zip archive also contains the GRCMILabDefaultXLCustomizations.exportedUI file, which will be updated by the software to match the user's setup and renamed and may be used to replace the user's previously existing Excel Quick Access Toolbar (QAT) with the GRC MILab QAT customizations instead, if desired. In addition, all importer template files included with the original Granta version of the software and required for processing of data from non-Generic and non-Generic Cyclic test types are also included. See Table 1 for a list and description of all files found in the .zip archive.

1.1 GRC MILab Software Description

As mentioned earlier, the GRC MILab Excel add-in software discussed in this document represents an update to the original MILab software originally developed by Granta Design Ltd. The Glenn update consists of two test-type modules, the Generic and Generic Cyclic modules. Both provide what is, essentially, a generalization of the original MILab software, where test runs are divided into a series of individual stages, with each stage type as defined in Table 2.

The Generic module enables multiaxial test data from any sequence of tensile, compression, relaxation, and/or creep test stages to be imported into Excel from either an Excel spreadsheet or a text data file. Following interactive stage definition (i.e., specification of where each stage ends), it also provides the ability for the user to analyze the imported data. All imported data and analysis results are output to one or more corresponding Generic-template-based workbooks in a format so as to be ready for immediate upload to the MI database. Features implemented in this module include the ability to interactively add, insert, and/or delete individual stage end points, as required; the ability to perform stage-type-appropriate analysis for each specified stage, regardless of the exact order specified during a given test or the total number of stages defined; the ability to reanalyze any individual stage after completing the initial analysis; and the ability to pause or stop the analysis at any point in the process and restart at a later time, picking up from the last point reached during processing.

TABLE 1.—GRCMILAB.ZIP ARCHIVE FILES

GrantaMI_Lab_StaticDynamic_Instructions_v1.4.4.pdf	User's guide for the original Granta-developed MILab software (Granta Design Ltd.), entitled, MI:Lab Static & Dynamic Operating Instructions, and containing detailed information on the software's operation (Ref. 1)
GraphData.dll	Dynamic link library included with the original Granta-developed MILab software
GRC MILAB Analyser 1.4.xla	Microsoft Excel add-in that implements the graphical user interface and associated functionality for the GRC MILab software
GRC MILAB Importer 1.4.xla	Excel add-in that provides text data import functionality in support of the GRC MILab software
GRCMILabDefaultXLCustomizations.exportedUI	Excel Quick Access Toolbar (QAT) customizations file used to replace the user's previously existing Excel QAT with a toolbar that includes buttons to display Generic Cyclic reference blocks, to stop the active MILab test run, and to lock or unlock the active test data file from a Generic or Generic Cyclic test run
GRCMILabQuickStartGuide.pdf	This document (GRC MILab Software: Quick Start Guide)
lab.chm	Compiled HTML help file used to access MILab help system information from within Excel
MILAB_CompWS.xls	Importer template file required to analyze test data from a compression test
MILAB_CreepWS.xls	Importer template file required to analyze test data from a creep test
MILAB_E1820WS.xls	Importer template file required to analyze test data from a fracture toughness test conducted according to the ASTM E1820 testing standard, Standard Test Method for Measurement of Fracture Toughness (Ref. 2)
MILAB_E399WS.xls	Importer template file required to analyze test data from a fracture toughness test conducted according to the ASTM E399 testing standard, Standard Test Method for Plane-Strain Fracture Toughness of Metallic Materials (Ref. 3)
MILAB_E561WS.xls	Importer template file required to analyze test data from a fracture toughness test conducted according to the ASTM E561 testing standard, Standard Test Method for KR Curve Determination (Ref. 4)
MILAB_FatigueWS.xls	Importer template file required to analyze test data from a fatigue test
MILAB_FCGdwellWS.xls	Importer template file required to analyze test data from a fatigue crack growth dwell test
MILAB_FCGWS.xls	Importer template file required to analyze test data from a fatigue crack growth test
MILAB_GenericSheetsWS.xlsm	One of two importer template files required during the analysis of test data from a Generic or Generic Cyclic test, and used while exporting data to separate stage and/or cycle data files in order to address memory limitations within Excel
MILAB_GenericWS.xlsm	One of two importer template files required during the analysis of test data from a Generic or Generic Cyclic test, and used as the template for the master data file during a Generic Cyclic test run or as the template for the final set of stages analyzed during a Generic test run
MILAB_RelaxWS.xls	Importer template file required to analyze test data from a relaxation test
MILAB_TensileWS.xls	Importer template file required to analyze test data from a tensile test
Mscomct2.ocx	Microsoft Windows Common Controls 2 ActiveX Controls (SP4) module, used by the Excel add-in but not guaranteed to be provided by Microsoft with the operating system version installed on the user's computer
MSCOMCTL.OCX	Microsoft Windows Common Controls 6.0 ActiveX Controls (SP6) module, used by the Excel add-in but not guaranteed to be provided by Microsoft with the operating system version installed on the user's computer
NamedRange.xla	Granta-developed Excel add-in application that may be used to add named ranges scoped to the referenced worksheet to Excel
SeriesGraphData.dll	Dynamic link library included with the original Granta-developed MILab software

TABLE 2.—GRC MILAB SOFTWARE
STAGE TYPE SPECIFICATION

(a) Stage type

[First stage of a noncyclic test, and first stage of each cycle in a cyclic test, must be a tensile or compression loading stage.]

Control mode	Parameter value
Creep	
σ (stress)	$\dot{\sigma} = 0$ (stress rate = 0)
F (load)	$\dot{F} = 0$ (load rate = 0)
Relaxation	
ε (strain)	$\dot{\varepsilon} = 0$ (strain rate = 0)
Tensile loading	
σ (stress)	$\dot{\sigma} > 0$ and $\sigma > 0$
F (load)	$\dot{F} > 0$ and $F > 0$
ε (strain)	$\dot{\varepsilon} > 0$ and $\varepsilon > 0$
Tensile unloading	
σ (stress)	$\dot{\sigma} < 0$ and $\sigma > 0$
F (load)	$\dot{F} < 0$ and $F > 0$
ε (strain)	$\dot{\varepsilon} < 0$ and $\varepsilon > 0$
Compression loading	
σ (stress)	$\dot{\sigma} < 0$ and $\sigma < 0$
F (load)	$\dot{F} < 0$ and $F < 0$
ε (strain)	$\dot{\varepsilon} < 0$ and $\varepsilon < 0$
Compression unloading	
σ (stress)	$\dot{\sigma} > 0$ and $\sigma < 0$
F (load)	$\dot{F} > 0$ and $F < 0$
ε (strain)	$\dot{\varepsilon} > 0$ and $\varepsilon < 0$

(b) Definition of zero

[“Start value” and “end value” are set to first and last values, respectively, as computed on a regression line through the data.]

Mode	Value
Stress	Abs(start value – end value) < 5 psi
Load	Abs(start value – end value) < 10 lb
Strain	Abs(start value – end value) < 0.02 percent

The Generic Cyclic MILab module provides the ability to import up to 100 distinct cycles of multiaxial test data from an ASCII text data file and analyze the associated data. Each such cycle will have a corresponding test profile consisting of any number of tensile, compression, relaxation, and/or creep test stages performed in any order, with the same sequence repeated for a given number of cycles. This set of contiguous cycles represents an individual "block." The software is able to import and analyze data from any number of distinct blocks in a single data file, provided the total number of cycles of data being imported does not exceed 100 cycles. All imported data, as well as the analysis results, are written out to a series of corresponding Generic Cyclic template-based workbooks, formatted for immediate upload to the MI database. Features implemented in the Generic Cyclic module include the ability to perform individual cycle selection and data display both preanalysis and postanalysis; to perform manual (required for the first cycle of each block) and/or automated cycle stage specification; to perform automated analysis of all cycles other than the first cycle of each block; to perform the analysis and/or reanalysis of test data from any individual cycle, independent of the state of processing for the rest of the test; the ability to pause or stop, and subsequently restart, a partially completed run**,** other than during automated analysis; and the ability, if automated cycle stage end point identification should fail to properly initialize stage end points for all cycles, to determine which cycles are fully defined, and thus available for analysis and provide the user with the option to selectively analyze a given subset of cycles that are currently available.

2.0 Software Installation

2.1 GRC MILab Add-In Installation Procedure

Note: If an earlier version of the MILab software has been previously installed in Excel, see Section 2.2 before proceeding.

1. To begin, find the directory where the GRCMILab.zip file is located, right-click on the file name, and select the Extract All menu option to extract all files, specifying the directory that is to be used as the executable directory for the Excel add-in as the destination directory.
2. Next, Excel must be configured to add the required Trusted Locations, to enable the importer template and any resulting processed data files that will subsequently be created to function properly:
   a. Open Excel.
   b. Select File: Options: Trust Center (Figure 1(a)).
   c. Click on the Trust Center Settings command button, on the right (Figure 1(b)).
   d. Select Trusted Locations from the list on the left (Figure 2(a)).
   e. Click on the Add new location command button on the bottom right (Figure 2(b)) to open the Microsoft Office Trusted Location dialog (see Figure 3).
   f. Click on the dialog's Browse command button, navigate to the directory where the extracted GRC MILab application files are located and select the relevant directory.
   g. If raw test data files to be processed are to be located within the same directory hierarchy as the selected folder (i.e., within the same directory hierarchy as the application files), ensure that the check box "Subfolders of this location are also trusted" is checked (Figure 3).
   h. Click on the Microsoft Office Trusted Location dialog's OK command button to accept the updated settings and close the dialog.
   i. If raw test data files to be processed are to be located in a directory hierarchy other than the directory where the application files have been placed, or if at any point, raw test data files are placed within a directory hierarchy other than one that has already been added as a trusted location, repeat the previous process to add that directory as a trusted location, ensuring that the check box "Subfolders of this location are also trusted" is also checked for any added directory.
   j. Once all required directories have been added as trusted locations, click on the Trust Center dialog's OK command button to close the dialog and return to the Excel Options dialog.
3. Next, select Add-In from the list displayed in the left-hand column of the Excel Options dialog (Figure 4(a)) to display the Add-Ins page of the dialog.
4. In the Manage: dropdown box on the bottom left (Figure 4(b)), ensure that Excel Add-Ins is selected, and then click on the Go… command button.
5. The Add-Ins dialog, shown below in Figure 5, will open. Click on the Browse… button and navigate to the directory where the extracted GRC MILab application files are located.
6. Select the GRC MILAB Analyser 1.4.xla file and click on the OK command button to close the dialog. The Add-Ins menu pick should now be visible on the Excel Menu Bar and, when selected, should display the MILab add-in custom toolbar, shown in Figure 6.

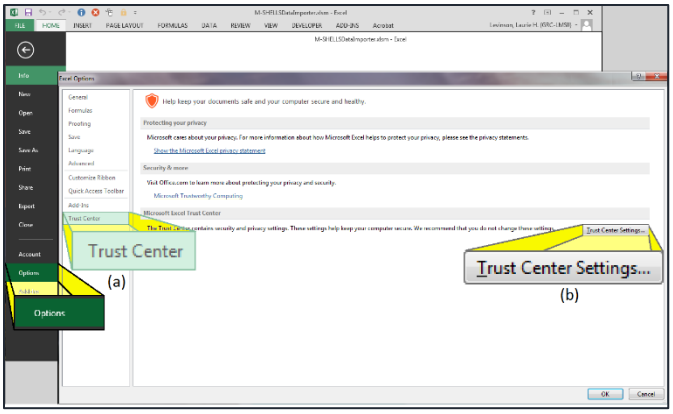


Figure 1.—Excel Options dialog, Trust Center selection.

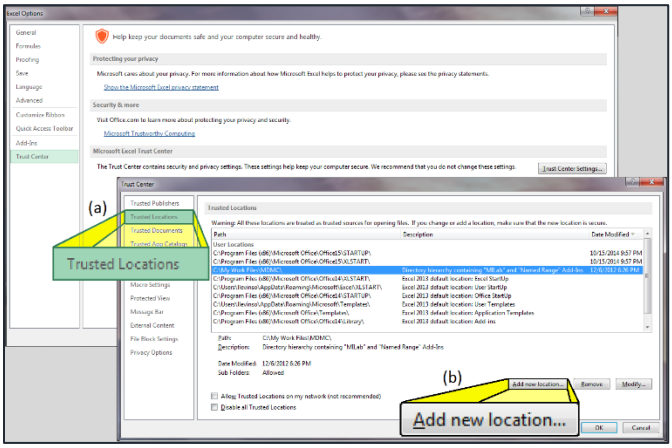


Figure 2.—Excel Trust Center dialog, Trusted Locations selection.

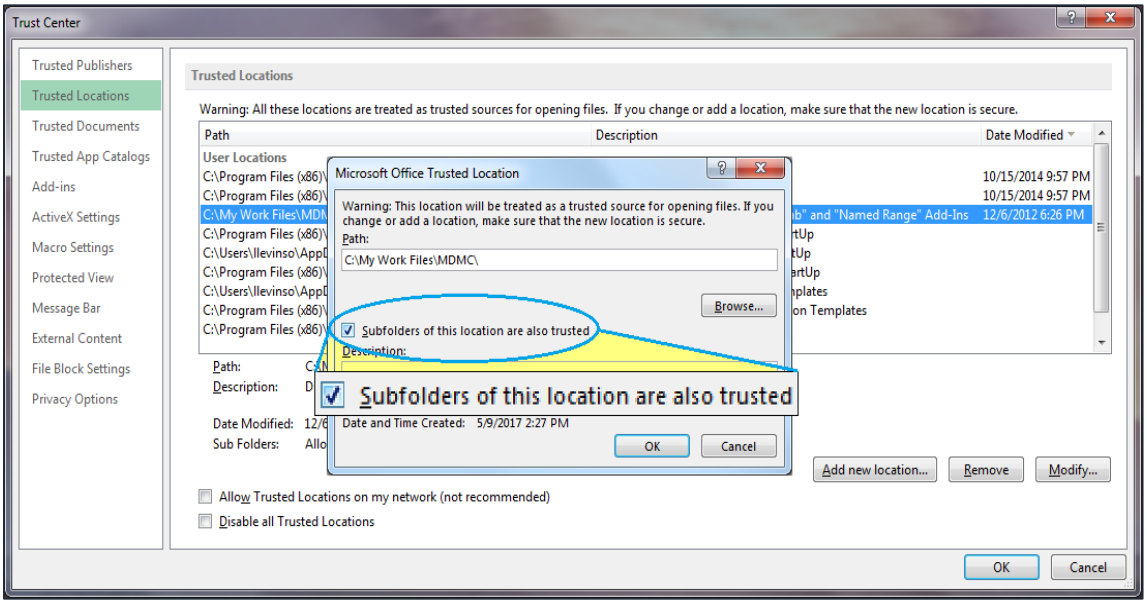


Figure 3.—Microsoft Office Trusted Location folder selection dialog.

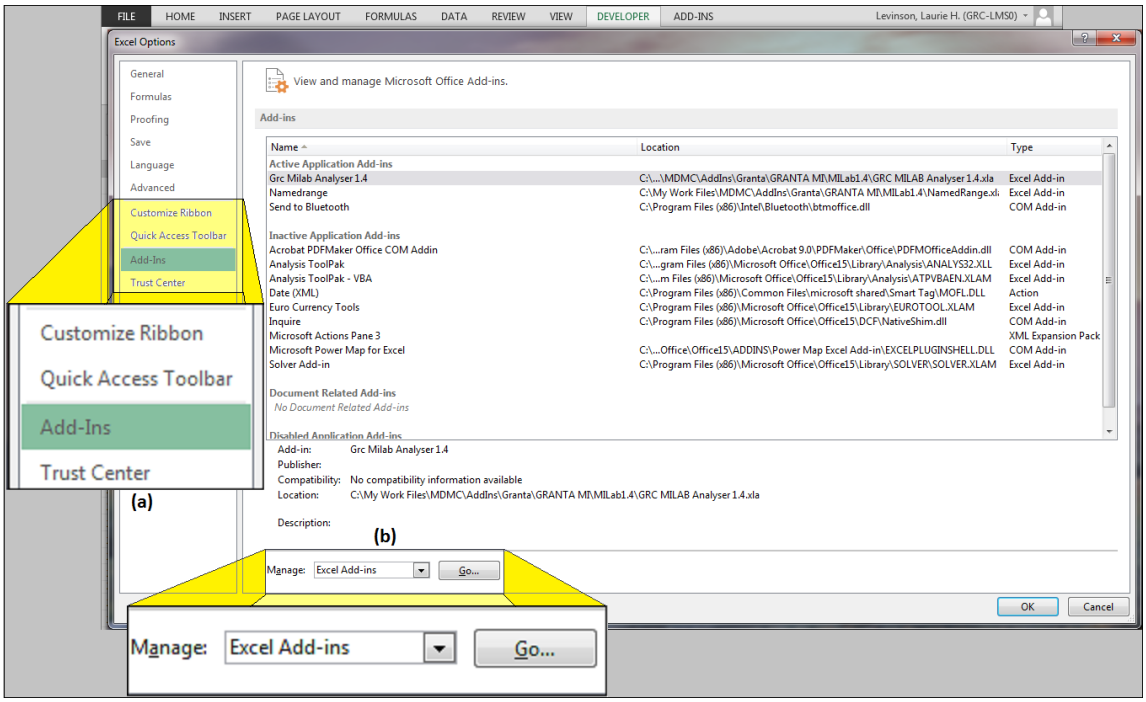


Figure 4.—Excel Options dialog with Add-Ins page of dialog selected.

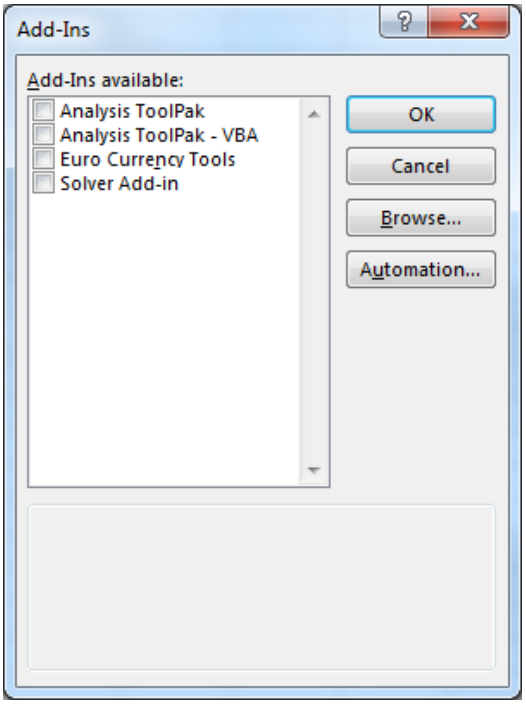


Figure 5.—Excel Add-Ins Dialog used to install the GRC MILab Add-in.

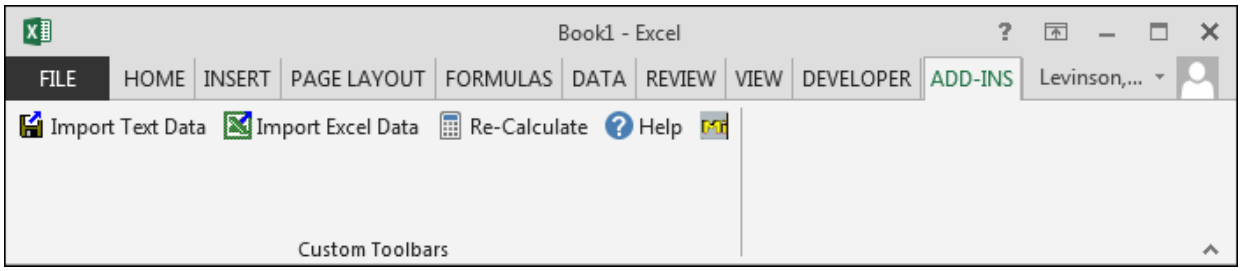


Figure 6.—MILab Add-In Custom Toolbar.

2.2 Updating Add-In Installation

If the GRC MILab add-in software is to be installed in Excel when a prior version of the software is already installed, updating the installation is accomplished as follows:

1. Select File: Options: Add-Ins to display the Add-ins page of the Excel Options dialog (Figure 4(a)).
2. In the Active Application Add-ins section of the list box at the top of the page, locate the MILab Excel Add-In.
3. If, in the Location column, the directory given for the existing MILab add-in is the same directory as the directory where the updated version of the software is to be placed, and the add-in file name displayed is the same as the GRC MILab add-in file name (i.e., GRC MILAB Analyser 1.4.xla), click on the Cancel command button to exit the dialog, close Excel, and copy the files extracted from the .zip archive into the previously specified directory, overwriting any existing files, as necessary. Note that Excel must not be running in memory when the files are copied into the existing directory, so it is important to ensure that the application has completely closed before copying the files.
4. If, upon checking the Location specification for the prior version of the MILab add-in, a different directory is to be used for the updated software and/or the prior file name does not match the updated add-in file name, the previous version of the software must be entirely removed from Excel before the updated version can be installed. To remove the previous version:
   a. In the Manage: dropdown box on the bottom left of the Add-Ins page, ensure that Excel Add-ins is selected, and then click on the Go command button (Figure 4(b)). The Add-Ins dialog (Figure 5) will be displayed.
   b. Locate the MILab Add-In in the list of available add-ins, uncheck the corresponding check box, and click the OK command button to close the dialog box.
   c. Select the Add-Ins tab on the Excel Menu Bar and move the mouse until any one of the custom toolbar buttons (see Figure 6) is highlighted.
   d. Right-click on the highlighted button and select Delete Custom Toolbar on the pop-up menu. When the warning message displays asking for confirmation, click the Yes command button.
   e. Close and reopen Excel and confirm that the custom toolbar is no longer being displayed. Then, proceed with Section 2.1.

2.3 Custom Quick Access Toolbar Installation (Optional)

The custom GRC MILab QAT provides toolbar buttons to enable quick access to basic functions that may be required while processing Generic or Generic Cyclic test data: displaying Generic Cyclic reference blocks, stopping the active test run, and locking or unlocking the active Generic template-based data file (see Section 3.7 for additional details). Note that, if the user chooses to install the custom GRC MILab QAT, all buttons previously available on the user's QAT will be replaced with the GRC MILab

QAT buttons, as opposed to having the existing toolbar being supplemented by the GRC MILab QAT buttons. Following installation of the GRC MILab QAT, however, the user may add any buttons desired to the updated toolbar, including those that had previously been available on the user's QAT, via Excel's built-in QAT functionality, as described in the following.

To replace the existing Excel QAT with the custom GRC MILab QAT, after installing the GRC MILab add-in:

1. Select File: Options: Quick Access Toolbar (see Figure 7(a)).
2. Click on the Import/Export dropdown (Figure 7(b)).
3. Click on Import customization file (Figure 8(a)), navigate to the previously specified directory where the GRC MILab application files are located, select the user-specific customizations file, GRCMILabUserXLCustomizations.exportedUI, and click the Open command button (note: if a file with the referenced file name is not found in the application files directory, close Excel, ensuring that the application is removed entirely from memory, and then reopen and try again).
4. To add buttons for other commands to the QAT, select the relevant command from the left-hand list, and click the Add button (Figure 8(b)) to move the command from the list on the left to the list of QAT commands on the right.

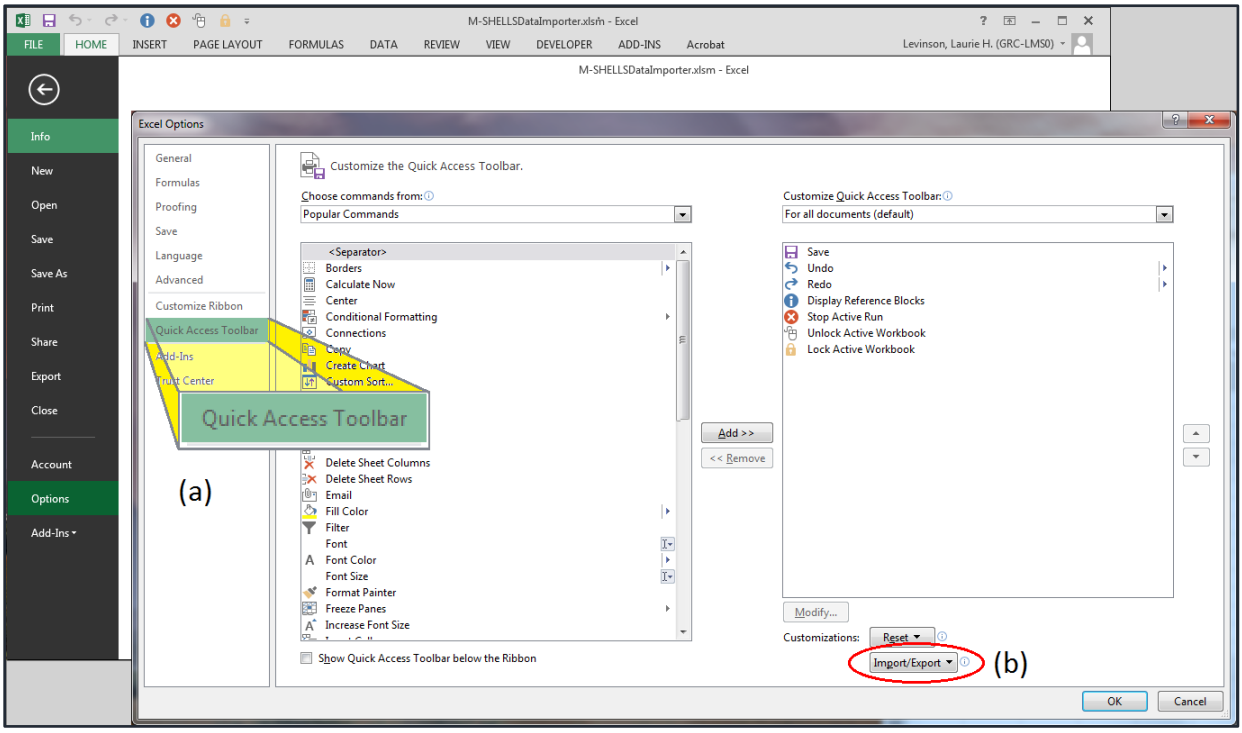


Figure 7.—Excel Options dialog used to install GRC MILab Quick Access Toolbar.

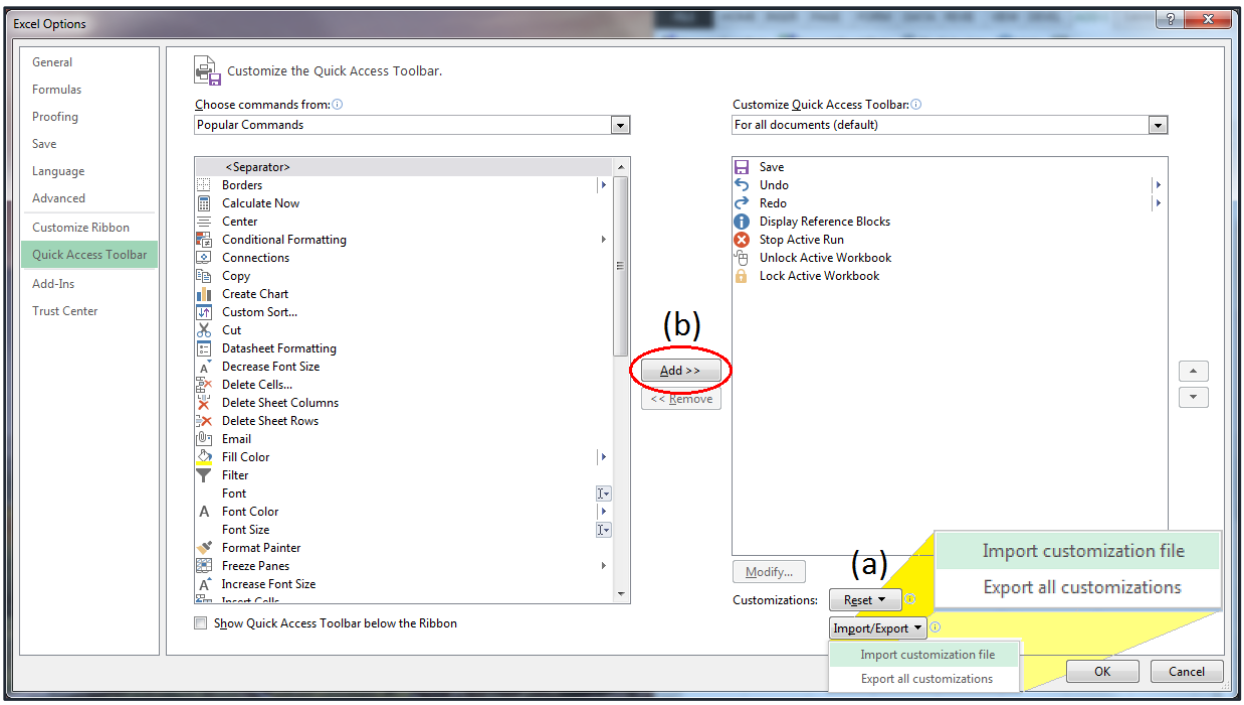


Figure 8.—GRC MILab Quick Access Toolbar (QAT) installation and addition of Excel-provided icons to custom QAT.

3.0 Processing of Raw Test Data From Generic Test

A Generic test consists of any number of tensile, compression, creep, and/or relaxation test stages, up to 40 stages total, combined in any order—other than the first stage, which must be either a tensile or compression loading stage. The steps involved in analyzing data from a Generic test are as described in the following sections.

3.1 Raw Test Data Import

The first step in the analysis process is to import the raw test data from either an ASCII text file or an Excel file into a Generic template-based Excel file. To import the data:

1. Select the Add-Ins menu item from the Excel menu bar.
2. On the MILab add-in custom toolbar (Figure 6), click on the Import Text Data or Import Excel Data command button, as appropriate based on the raw test data file format.
3. Upon display of the associated dialog, provide the requested user input as described in Reference 1, Section 2.1, Importing from Text Files, or Section 2.2, Importing from Excel Files, clicking the OK (for text import) or Single Workbook (for Excel import) command button when ready to proceed.
4. After clicking the OK command button, a template-based workbook, named by default, [raw_test_data_file_name]-[raw_test_data_worksheet_name].xlsm, if importing Excel data, or [raw_test_data_file_name].xlsm, if importing text data, will be opened, and upon completion of the data import process, the imported data displayed on the workbook's Generic Data worksheet. If a file with the default file name is found to already exist in the selected directory, a message dialog will first be displayed, asking whether to overwrite the existing file. Select Yes to overwrite the existing file, No to display a dialog to provide a different file name; and Cancel to cancel the import process and exit.
5. If continuing the data import process, the Test Specification dialog will next be displayed (Figure 9). Fill in the requested pedigree information and click OK to begin the data import. (Note that clicking the dialog's Cancel button will abort the import process, requiring a restart from step 2 before continuing). Once complete, the raw data import completed message dialog, shown in Figure 10, will be displayed to indicate success.

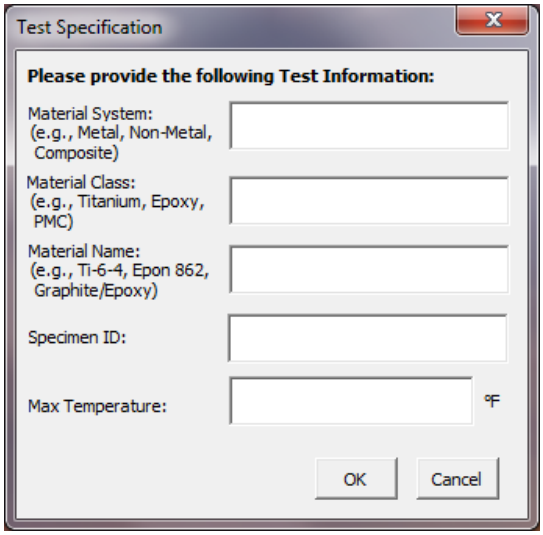


Figure 9.—Test Specification dialog, used to ensure that important pedigree information associated with test is provided.

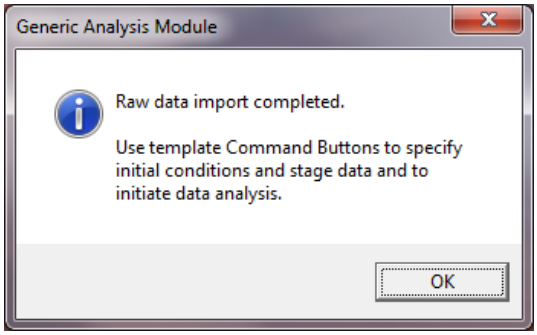


Figure 10.—Message dialog indicating test data import has successfully completed.

3.2 Setting Initial Conditions

Following successful import of the test data into Excel, initial conditions must be specified in order to identify the start of the first stage. This may be accomplished as follows:

1. Click on the Generic Data worksheet's Specify Initial Conditions command button (see Figure 11) to display the corresponding dialog (Figure 12).
2. Enter the total number of stages in the test (an integer between 1 and 40) into the # Stages text box. Note that the View Chart Data command button, found on the lower left of the dialog, has been provided in order to assist the user in determining the correct number of stages to specify. Upon clicking the button, one of two worksheets used to display plots of imported test data is displayed, along with the Modify Display Settings dialog (Figure 13), which can be used to scroll and/or zoom the display, as well as to switch between the two worksheets used to display test data plots (for tests with valid data available for display on both worksheets). When finished viewing the plotted data, the Done (Close Window) command button may be clicked to close the dialog and restore the display to the data worksheet and associated user input dialog.
3. Next, click in any other text box on the Specify Initial Conditions dialog (Figure 12) and an input text box will be displayed (see Figure 14), prompting the user to select the worksheet row containing the relevant initial value. Click on any cell from the Generic Data worksheet row that contains the first test data point to be included in the analysis (Figure 15), and then click the OK command button to close the input text box. The relevant values from the selected row of data will then be populated into each of the dialog's text boxes, ensuring consistency of the data across all input parameters. Note that, while the input text box is being displayed, it is also possible to type the relevant row reference value directly into the input box rather than selecting the value as described previously. However, the preferred method for selecting the appropriate row is to click on the relevant worksheet cell, to ensure the proper cell reference format is used. If, however, the user chooses to type a value into the input box manually and fails to use the proper format, a warning message will be displayed indicating how to properly identify the requested reference. Before attempting to correct the value as described in the message, however, it is important to first clear the input text box by deleting the previously specified value.
4. Once the requested input has been provided, click OK to close the dialog.

Note that, at any point while the Specify Initial Conditions dialog is being displayed, the # Stages text box may be cleared and all remaining text boxes reset to their initial state by clicking on the Reset All command button in the bottom left corner of the dialog (see Figure 12).

It is also possible to exit the dialog without providing the requested input by clicking on the Cancel command button. Note that this will pause processing indefinitely, and the setup cannot proceed to the next step (stage end point definition) until the requested input has been provided. Additionally, it should be noted that, until the number of stages has been specified, the Record Name field displayed on the Generic Data worksheet will contain three asterisks, as shown in Figure 15. The asterisks will be replaced with the text, "_[x]_Stages" (during Generic runs) or "_[x]_Cycles" (during Generic Cyclic runs), where x equals the number of stages specified, or the number of cycles imported, respectively, once the process of setting the initial conditions has been completed.

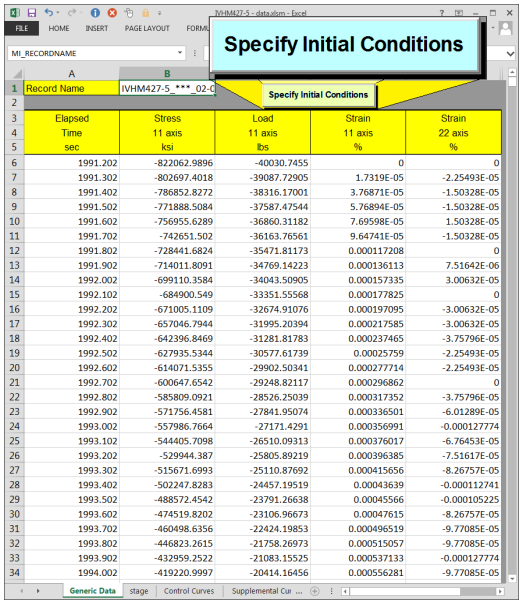


Figure 11.—Specify Initial Conditions command button on Generic Data worksheet.

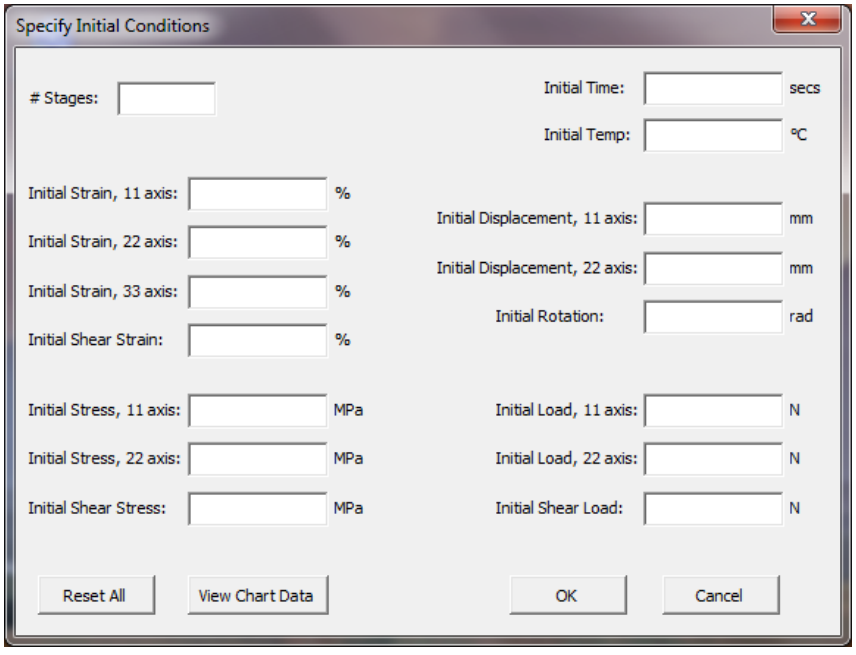


Figure 12.—Dialog used to specify initial conditions for Generic Test data analysis.

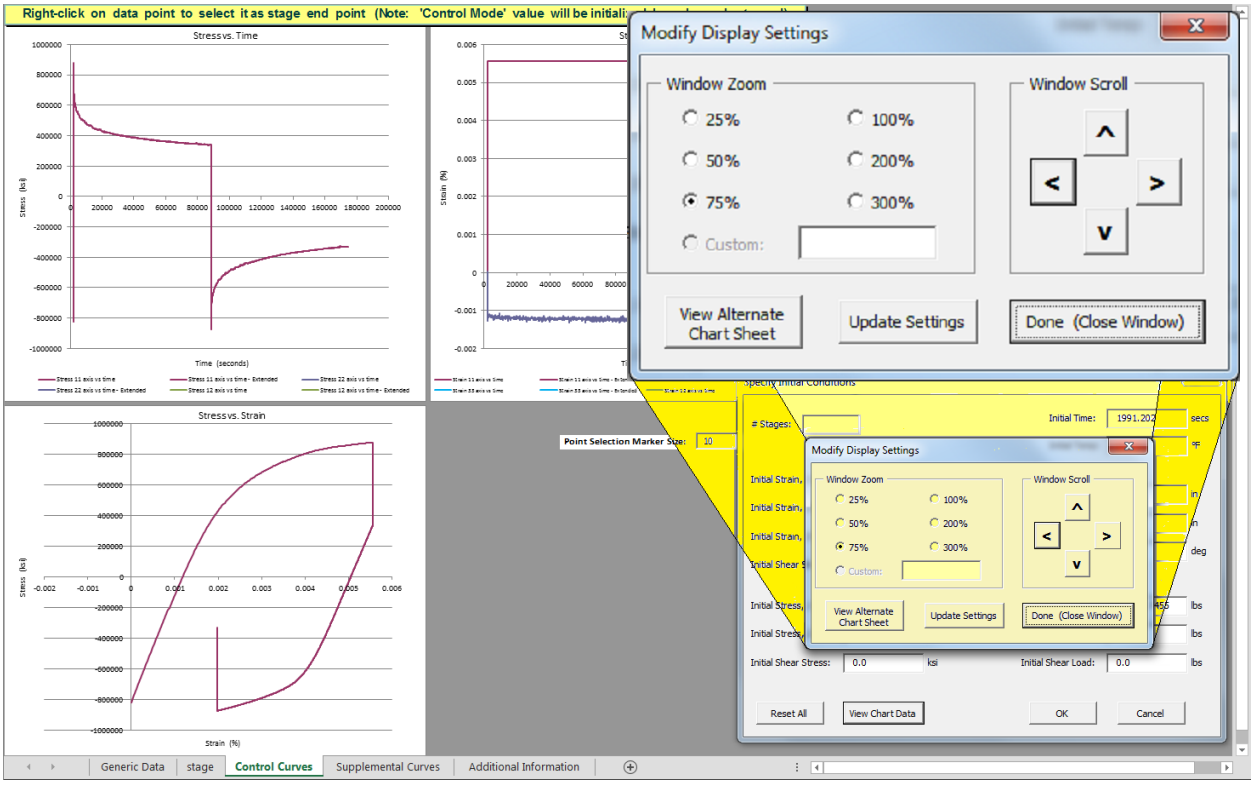


Figure 13.—Control Curves worksheet plots, along with Modify Display Settings dialog, displayed after user clicks Specify Initial Conditions dialog's View Chart Data command button.

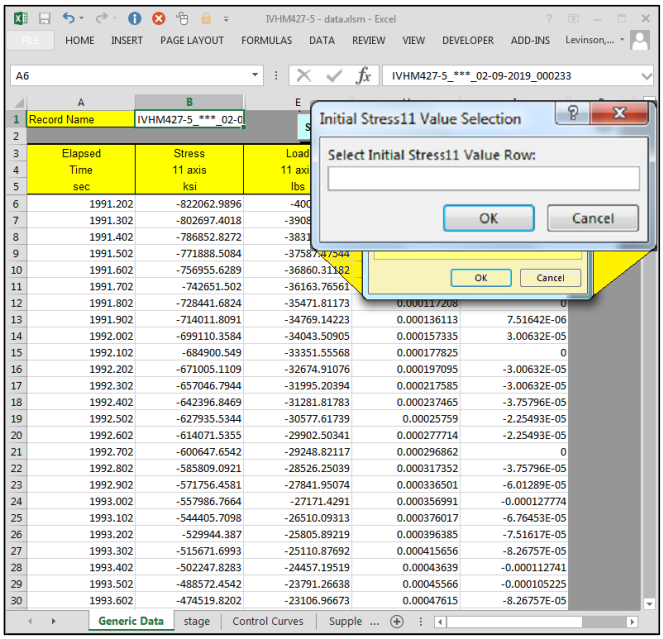


Figure 14.—Input text box displayed to enable user to select initial value row.

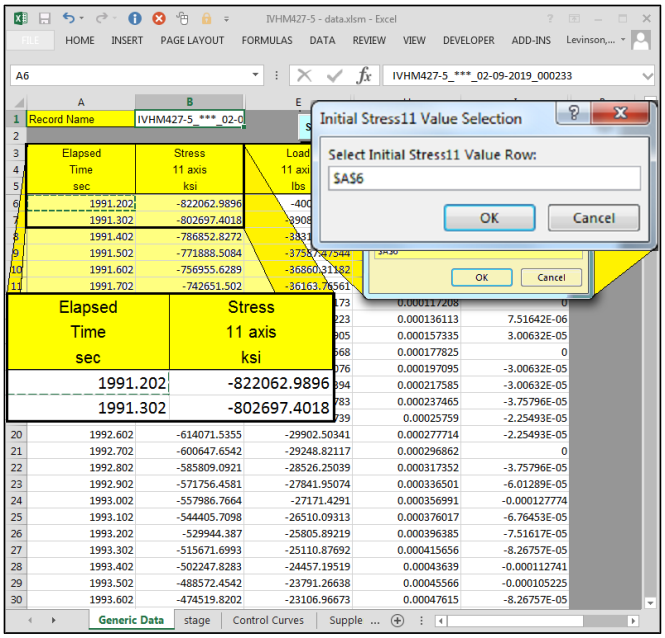


Figure 15.—Input text box following selection by user of cell indicating initial value worksheet row.

3.3 Stage End Point Definition

Once the initial conditions have been set, including specifying the number of stages to be analyzed, the next step in the process is to complete the setup by identifying the location of each specified stage end point. For each such stage, this part of the process consists of an optional first step, identifying the location of the stage end point graphically; followed by a required step, either refining or providing the stage end point location input via the Specify Stage Parameters dialog; followed by a potential third step, manually modifying the stage type value. It is important to note that, if both of the first two steps are used, the optional first step (identifying the location of the stage end point graphically) may be executed for some or all stages to be specified, followed by performing the second (required) step for those stages. Alternatively, the two steps may be performed sequentially, one stage at a time (i.e., (optional) stage 1 step 1 followed by (required) stage 1 step 2, then (optional) stage 2 step 1 followed by (required) stage 2 step 2, etc.). That is, if both steps are to be used, the stages may be specified by either completing the first optional step for some or all stages and then completing the second required step for those stages; by completing the first and second step for the first stage, followed by the first and second step for each successive stage; or by utilizing any combination of the previous sequence of steps. Additionally, while identifying the stage end points graphically prior to providing input via the Specify Stage Parameters dialog is optional, the advantage to including this optional first step is that it will facilitate and expedite the overall process of identifying stage end points. This is because, even though the resolution of the graphical capabilities within Excel is not sufficient to guarantee selection of the precise data point desired when using the graphical approach, identifying the stage end point via the plotted data is almost always more intuitive and will provide, at a minimum, a close approximation to the location of the actual stage end point. Therefore, when subsequently identifying the stage end point location via the dialog, the Generic Data worksheet cell where the actual stage end point value is located will be easier to locate as a result of having already identified and marked (as will be described in the following) a nearby cell.

3.3.1 Graphical Identification of Stage End Points (Optional)

To identify the location of each stage end point graphically, the Excel chart that displays a plot of the data from the stage's control variable should be used. The reason for this, as indicated at the top of each worksheet displaying the plots, is that the stage's Control Mode value used by the software and finalized via the Specify Stage Parameters dialog will be initialized based on the chart used to identify the stage end point. Stress, strain, and temperature data plots are displayed on the Control Curves worksheet, while load, displacement, and rotation data plots are displayed on the Supplemental Curves worksheet. In each case, the value displayed on the y-axis of the chart will be the value used to initialize the Control Mode setting for that stage when the Specify Stage Parameters dialog is subsequently displayed. Note that, if no valid load, displacement, or rotation data exist, the Supplemental Curves worksheet will be hidden from the user, and only charts on the Control Curves worksheet will be available for use in identifying stage end points.

1. To begin, select the desired worksheet by clicking on the worksheet tab for the chart worksheet that displays the stage's control variable data, either the Control Curves or Supplemental Curves worksheet, as described previously.
2. Using the chart that plots the relevant control variable data on the y-axis, right-click on the plot location where the first stage end point is to be placed. An "X" will be added to the chart to mark the location, with the color of the "X" chosen according to the color sequence specified in Figure 16. The corresponding row of data on the Generic Data worksheet will also be highlighted to match the marker color. A Point Selection Marker Size dropdown box (Figure 17) has also been provided on each chart worksheet to enable the user to modify the size of the stage end point marker, if desired.
3. If other stage end points are to be identified graphically prior to finalizing stage end point parameters via the Specify Stage Parameters dialog, repeat step 2 here for each subsequent stage end point to be identified.

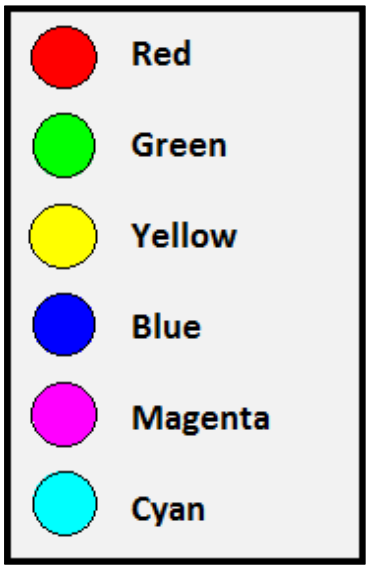


Figure 16.—Color sequence used in marking stage end points.

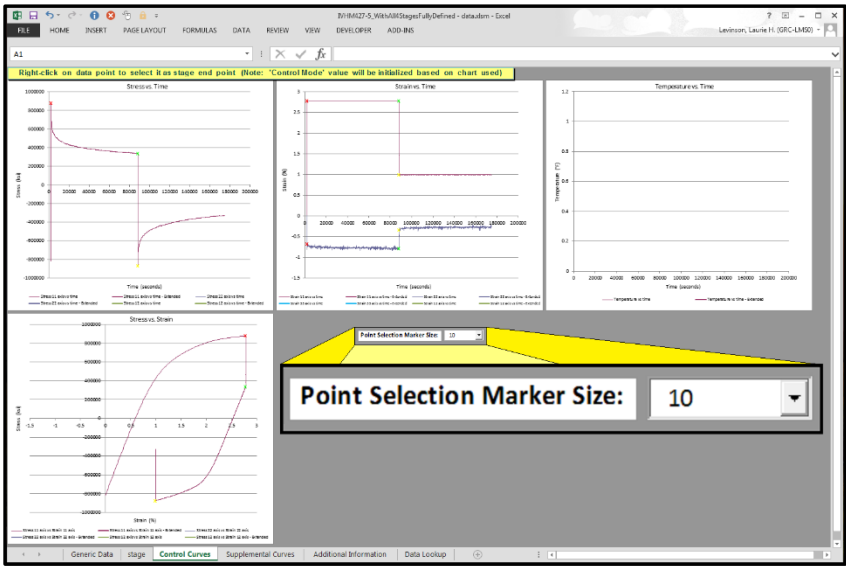


Figure 17.—Point Selection Marker Size: dropdown, used to change size of markers added to each chart to identify stage end point locations.

3.3.2 Stage End Point Parameter Specification via User Input Dialog

While Section 3.3.1 describes an optional first step that may be used to facilitate the identification of each stage end point, user input via the Specify Stage Parameters dialog is required in order to specify (in the case where graphical input has not been provided) or to update and finalize (when stage end points have first been identified graphically) stage-related parameters for each stage.

1. To begin the process, click on the Specify Test Stage Data command button on the stage worksheet (Figure 18) to open the Specify Stage Parameters dialog (Figure 19).
2. By default, the Stage Name attribute defined for each Generic stage is set to the stage number. If, however, the user wishes to include a descriptive prefix to further identify the stage, the desired prefix should be entered into the Stage Name Prefix text box.
3. Next, the Control Mode dropdown box should be used to specify the relevant Control Mode value. If before providing input via the dialog the user had identified the current stage end point graphically, this value will have been initialized based on the chart selected by the user during the graphical initialization of the stage end point. If the value selected is not correct, however, or if the value has not yet been specified because the stage end point was not previously identified graphically, the user should use the Control Mode dropdown box to specify the correct value. Available options are Stress, Shear Stress, Load, Shear Load, Strain, Shear Strain, Displacement, Rotation, and Temperature. If the user should select a value for which no data has been imported, an error message will be displayed prior to exiting the dialog informing the user that the input value must be corrected and processing cannot proceed to the next stage, or to the analysis if it is the final stage, until all required input values have been provided.
4. To provide the Target Value Row input, click in the dialog's associated text box. As with the Control Mode value, if the user had previously identified the current stage end point graphically, the Target Value Row text box will have been initialized based upon the data point selected by the user at that time, with the value set to the Generic Data worksheet row associated with the data point that was identified by the user. When the user subsequently clicks in the dialog's text box to update or confirm that preliminary value, a cell in that row will be automatically selected, and the worksheet will be scrolled to the corresponding highlighted row. This should then facilitate the process of determining the precise location for the current stage end point as, at a minimum, the row containing the relevant data should be relatively close to the highlighted row already selected. If, however, no stage end point for the current stage was graphically identified prior to providing input via the dialog, when the user clicks in the dialog's text box, the cell selected will be based upon the worksheet row associated with the previous fully specified stage end point, and the worksheet will be scrolled accordingly. The user will then need to scroll the worksheet until the relevant cell is displayed and select a cell in that row. No row associated with the current stage will be highlighted, however, to assist in the stage end point row identification process.
5. Lastly, if the user would like to provide any notes relevant to the current stage that should be maintained with the stage data, those notes may be typed into the Notes text box provided.
6. Once satisfied with the input provided, click on the dialog's OK command button to exit the dialog, at which point all stage parameter values will be computed by the software and written out to the relevant row of the stage worksheet.

It is also possible to exit the dialog without providing the required input by clicking the dialog's Cancel command button. A warning message will then be displayed asking the user to acknowledge that, if they proceed, processing will be paused until the associated input is provided. Clicking Yes will result in the Specify Stage Parameters dialog being closed, as requested, while clicking No will return the user to the dialog and permit additional input to be provided.

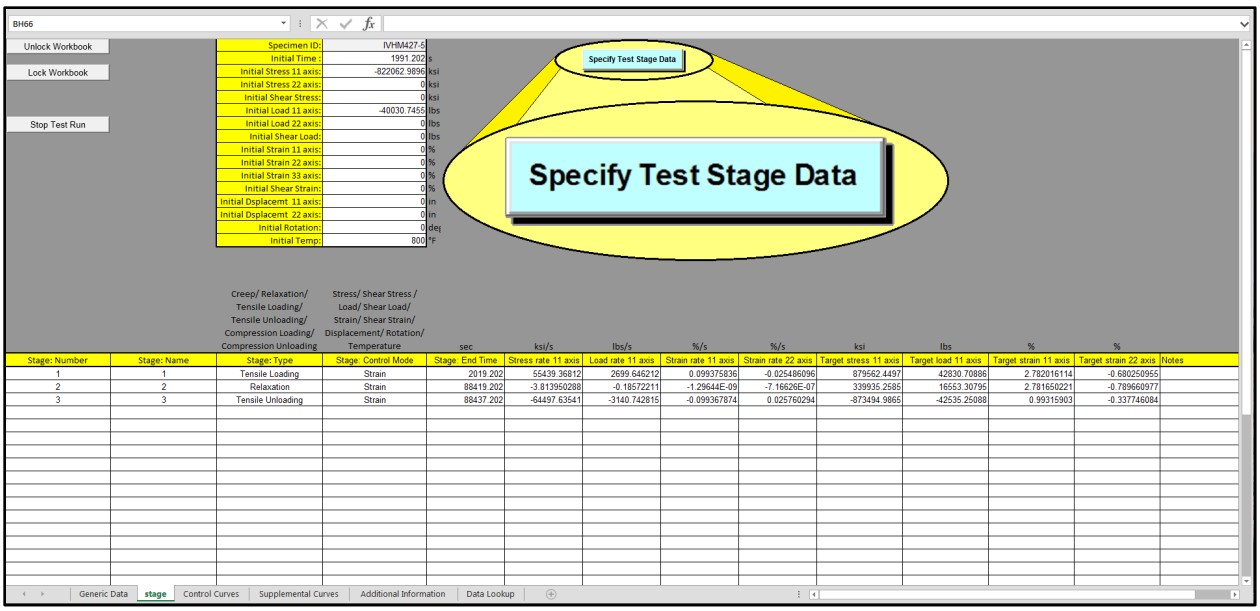


Figure 18.—Specify Test Stage Data command button found on stage worksheet and used to display Specify Stage Parameters dialog.

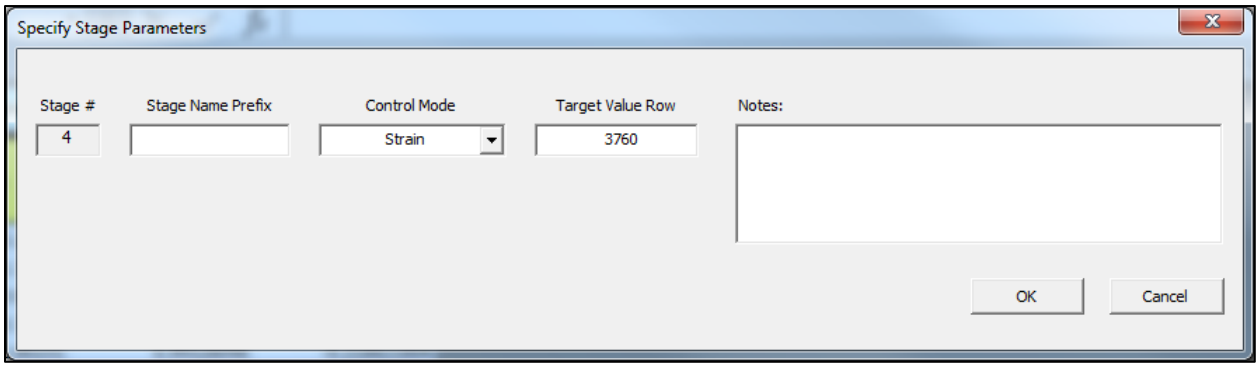


Figure 19.—Specify Stage Parameters dialog, used to specify and/or refine stage-related parameters.

3.3.3 Manual Update to Stage Data

As stated previously, once each stage end point has been fully specified via the Specify Stage Parameters dialog, and the dialog closed, the corresponding parameters for that stage are computed by the software and written out to the relevant row of the stage worksheet. While most of these values cannot be manually modified by the user without explicitly unlocking the workbook and, if modified in that manner, could lead to invalid analysis results, one exception to this situation has been provided. Because the stage type value is determined by an algorithm implemented in the software, which should generally provide the correct stage type value but is not guaranteed to do so, it is possible for the stage type value output to the Stage: Type column to be incorrect. For this reason, each cell in the Stage: Type column includes a dropdown box to enable the user to update the value output by the software, if necessary. Upon clicking on the dropdown arrow, a message will be displayed, warning the user that the currently specified value has been determined to be correct by the software, and asking the user to confirm their request to update the value (Figure 20). Clicking the [ESC] key will remove the warning message, while clicking on the dropdown arrow a second time will serve to confirm the request by displaying the list of options available to the user (Figure 21).

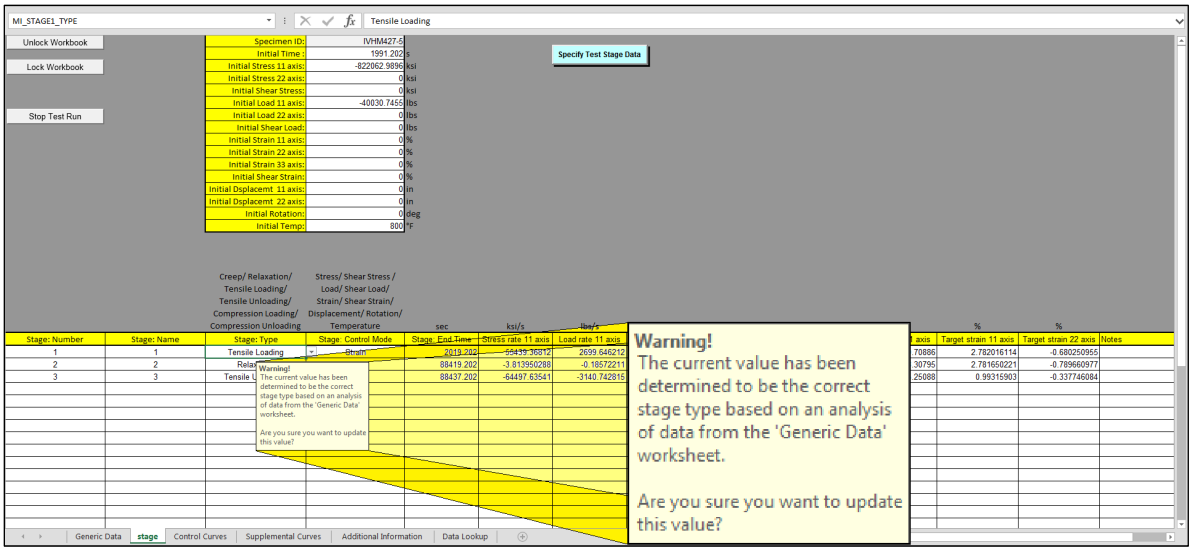


Figure 20.—Warning message displayed upon clicking on Stage Type dropdown arrow.

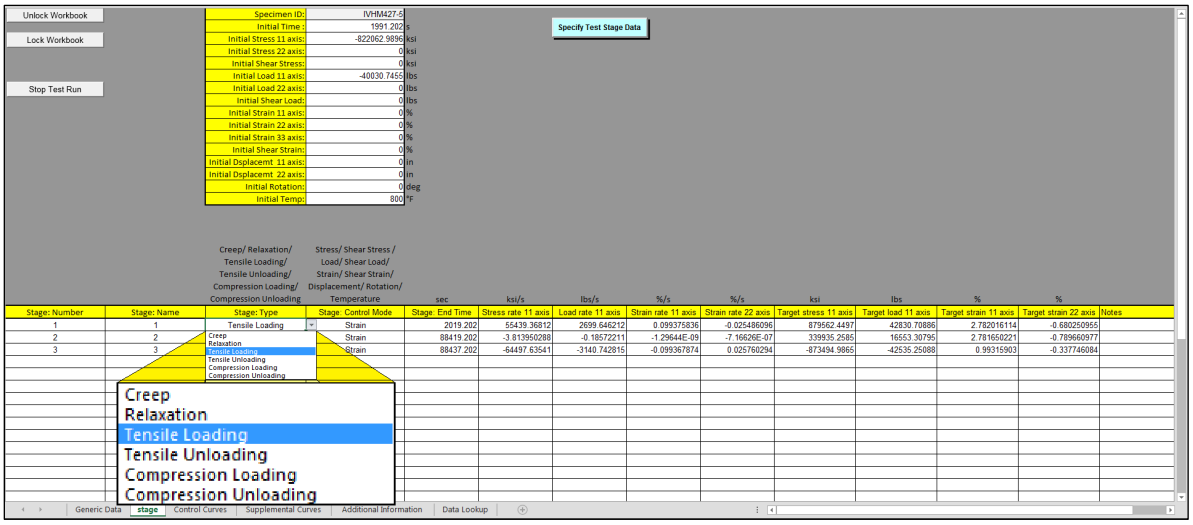


Figure 21.—Stage Type dropdown provided to enable user to manually update Stage Type value.

3.3.3.1 Deleting Stage End Points

If, at any time prior to beginning the analysis for a given stage, it is determined that the previously identified location of a stage end point, or any of the associated input, for that stage is not accurate, the stage end point may be deleted. This may be accomplished as follows:

1. Select the worksheet, either the Control Curves or Supplemental Curves worksheet, that displays one or more of the charts where the stage end point marker to be deleted is found. If the stage end point has only been identified graphically and not yet refined and fully specified via the Specify Stage Parameters dialog, the stage end point marker will only be found on the chart selected by the user when the stage end point was identified. If, however, the stage end point has already been fully specified via the dialog, the stage end point will be marked on all charts with valid data. In the latter case, any chart may be used to delete the stage end point.
2. Left-click on any of the identified stage end point markers. Selection boxes will be displayed indicating the location of all previously identified stage end points (Figure 22).

3. Left-click on the selection box of the stage end point to be deleted. The selection box for that stage end point will remain, and a dialog will appear asking the user to confirm that they would like to delete the marker (Figure 23). Click Yes to delete the marker (or No to cancel out without deleting the marker).
4. Once confirmed by the user, the stage end point marker will be removed from any chart(s) where it had previously been identified, and all associated data will be deleted. If any subsequent stage end points have been previously identified, the color of each such stage end point marker, and the highlight color used to identify the corresponding row on the Generic Data worksheet, will be updated to reflect the fact that they are now associated with a different stage in the sequence of stages (e.g., the stage end point marker that previously represented the fourth stage end point, marked in blue, represents the third stage end point once a preceding stage end point has been deleted; so the color of its marker is updated to yellow, as is the color used to highlight the associated row on the Generic Data worksheet). In addition, since any stage end point that has been fully specified will have an associated row of data on the stage worksheet displaying key parameter values associated with the stage, if the stage end point being deleted has been fully specified, the row of data on the stage worksheet associated with that stage will be deleted, and the data from each subsequent stage will be moved up one row, with the associated parameters recomputed and updated, as required.

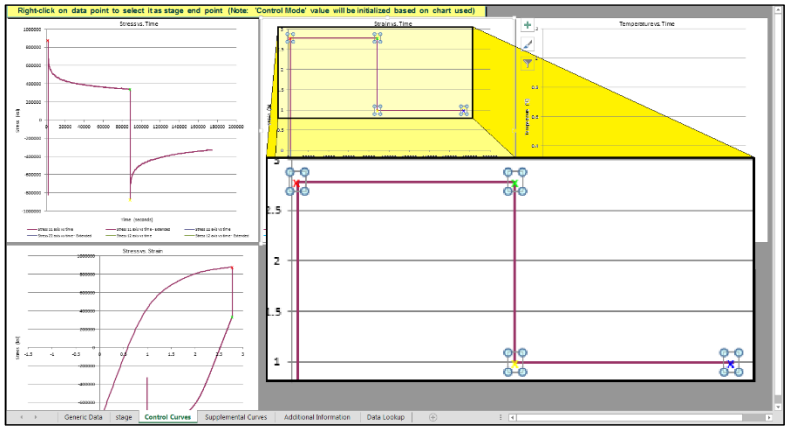


Figure 22.—Selection boxes displayed after left-clicking on any identified stage end point marker to delete stage end point.

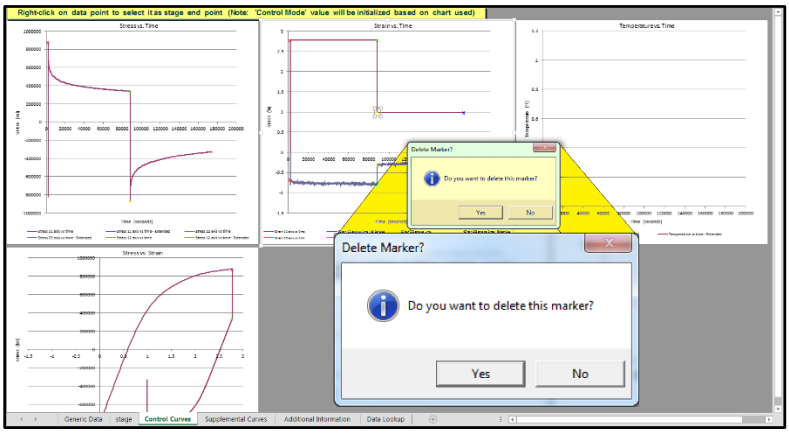


Figure 23.—Selection box and confirmation dialog displayed after left-clicking on marker for stage end point to be deleted.

3.3.3.2 Inserting Stage End Points

If, after identifying one or more stage end points, the user determines that an additional stage end point is required that is prior in time to an already identified stage end point (this is most likely to occur after an incorrectly specified stage end point has been deleted and then needs to be added back in with the correct parameters), the steps involved to accomplish this, or whether the stage end point can, in fact, be inserted at all, will depend upon the status of the stage end point that would immediately follow the new stage end point once it has been inserted:

- If the next stage end point has only been identified graphically, but not yet fully specified via the Specify Stage Parameters dialog, then the process used to insert a stage end point will be largely the same as the process used to identify any other stage end point graphically (i.e., by right-clicking at the desired location on the relevant chart series). The only additional step required by the user in this case will be to acknowledge the warning message that will be displayed indicating that the stage end point being added is earlier in time than a previously existing stage end point. In addition, the color of each stage end point marker that is located at a point later in time than the stage end point being inserted will be automatically updated to reflect its new position in the stage sequence, as will be the color of the corresponding highlighted row on the Generic Data worksheet.
- If the next stage end point has already been fully specified, however, the values computed for the stage parameters of the subsequent stage will have been determined based upon where that subsequent stage began. Because that location is determined by the location of the immediately preceding stage end point, which will change as a result of the new stage end point being inserted, it is necessary to identify the precise location for the inserted stage end point before the parameters for the immediately following stage can be recalculated. For this reason, immediately after identifying where the new stage end point is to be inserted by right-clicking at the desired location on the relevant chart series, the Specify Stage Parameters dialog will be displayed, and the user will be required to provide input as described in Section 3.3.2. Once this has been done and the user has exited the dialog, stage parameters for the inserted stage will be determined, and the parameters for the subsequent stage recalculated using the updated prior stage end point location. The parameter data for both stages will then be written out to the appropriate rows on the stage worksheet, with each row of parameter data associated with a subsequent fully specified stage first moved down one row on the worksheet, and the corresponding stage number for each such stage incremented by one, in order to accommodate the inserted stage.
- If, on the other hand, a subsequent stage end point is associated with a stage that has already been analyzed, no additional stage end points may be added prior to that stage. The only option in that case is to redo the test run and correct the stage end point specification process prior to beginning the analysis. This may be accomplished in one of two ways. By default, once all stage end points have been defined, and immediately prior to beginning the analysis, a copy of the current data file is automatically saved under the file name [current_filename_root]_[x]DefinedStages.xlsm, where [x] is the number of stages defined. To respecify stage end points once the analysis is already underway, the current data file may be closed, and the copied file opened instead. The run may then be restarted by clicking the Re-Calculate button on the GRC MILab toolbar, after which the specified stage end points may be updated prior to beginning the analysis. Alternatively, the run may be redone, proceeding from the raw data import process, through initial conditions specification and stage end point definition, as described in Sections 3.1 to 3.3.

3.4 Performing Analysis

Upon exiting the Specify Stage Parameters dialog after providing the required input for the final declared stage end point, a dialog will be displayed informing the user that the stage end point specification process has been completed and asking whether the user would like to begin the analysis. If the user clicks on the Yes command button, the message dialog will close, and the analysis process will begin. A separate worksheet, the Stage 1 Curves worksheet, will first be created and added to the workbook, and a dialog will then be displayed for use in providing the required input for the analysis of the first stage. This process will be repeated for each subsequent stage to be analyzed, with each Stage [x] Curves worksheet used to display the relevant detailed analysis plots and data resulting from the analysis of the corresponding stage. In each case, both the analysis data output and the type of input required in order to perform the analysis will be based upon the type of stage being analyzed (tensile/compression, creep, or relaxation). Thus, both the format of each Stage [x] Curves worksheet, as well as any user input dialog displayed prior to performing the stage analysis, will be specific to the type of stage being analyzed. In all cases, however, the first stage of a given Generic run must, by definition, be a tensile or compression loading stage. Therefore, the Stage 1 Curves worksheet will be formatted for the output of tensile/compression data, and the initial dialog displayed to begin the analysis will be the tensile/compression stage analysis dialog. Note that, due to the worksheets being created and added to the workbook, in addition to initializing and opening the corresponding analysis dialog, there may be a short delay before the analysis dialog appears.

If, in response to the dialog that asks the user whether to begin the analysis, the user selects the No option instead, the message dialog will close, and the caption on the stage worksheet's Specify Test Stage Data command button will be updated to display the caption, Begin Analysis. This command button may then be used, whenever the user is ready, to initiate the analysis, at which point, the message dialog will once again be displayed asking the user to confirm that the analysis process is to begin.

For additional information on use of the individual stage analysis input dialogs, see Reference 1. While there are minor differences in implementation between the original versions of the dialogs and the versions implemented in the Generic module, there is also a significant amount of overlap, and many relevant details are available in Reference 1. Note that information relevant to the Generic module's tensile/compression analysis dialog can be found beginning on page 18 of Reference 1, in the Tensile Test Data section (Section 3.1); and information relevant to the Generic version of the creep stage dialog is located beginning on page 24, in the Creep Test Data section (Section 3.3). Analysis of data from relaxation stages is entirely automated in the Generic module, so there is no associated analysis input dialog.

3.4.1 Modify Chart Display Settings Dialog

On both the tensile/compression and creep stage analysis dialogs, a new feature has been implemented in the Generic module that is not available on the original Granta versions of those dialogs. The Modify Chart Display Settings dialog (Figure 24(a)) accessed via the Modify Chart Display command button (Figure 24(b)), which is located in the lower left corner of each of the analysis dialogs, provides the ability for the user to modify the window scroll, zoom, and/or resolution while the analysis dialog is active. This feature has been provided to facilitate the user's ability to accurately identify appropriate values for the requested analysis input parameters.

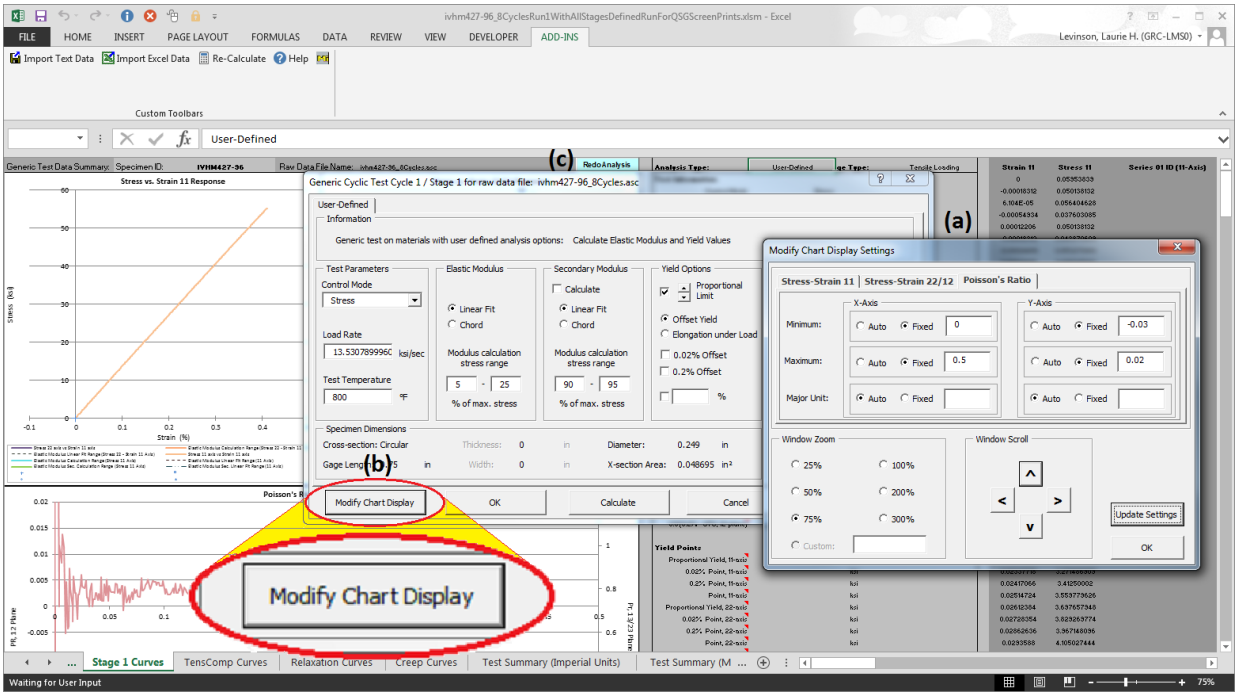


Figure 24.—Modify Chart Display Settings dialog as accessed from analysis form.

3.5 Stopping Test Run

Once data from a Generic test has been imported into Excel by clicking on the MILab add-in custom toolbar's Import Text Data or Import Excel Data command button, the initiated run will continue, nominally, until the analysis of all stages specified has been completed, the file is closed, or the run is explicitly stopped by the user. As closing a file prior to completing the active run without first stopping the run in progress could leave the file in an inconsistent state, preventing the user from successfully continuing the analysis at a later time via the Re-Calculate feature (Section 3.6), the ability for the user to explicitly stop a run has been implemented. This provides the user with the flexibility to gracefully end the run in progress at any point in the process, save and close the file, if desired, and then reopen the file at a later time, restart the run, and pick up processing from the previous stopping point.

To stop a run in progress, two different methods have been provided: clicking on the Stop Test Run command button on the stage worksheet, the third of three command buttons located in the upper left corner of the worksheet, or, if the user installed the GRC MILab QAT during the software installation process, clicking the Stop Active Run icon on the QAT (see Section 3.7 for additional details).

3.6 Recalculate Functionality

The Re-Calculate feature has been provided to enable the user to restart a run from the previous stopping point if, for any reason, a Generic test run was stopped prior to completion, or to enable the user to reanalyze data from one or more previously analyzed Generic test stages.

To begin, with the template-based file whose data is to be analyzed or reanalyzed open in Excel and selected as the currently active file, left-click on the Re-Calculate button on the MILab add-in custom toolbar (see Figure 6). The cursor will change from an arrow cursor to a "processing" indicator (a rotating "O") while the software is executing. When the required processing has been completed, the cursor will change back to the default cursor. Please wait for this to occur before attempting to proceed.

Next, if the recalculate option is being used to continue the initial analysis of a run that was stopped prior to completion, follow the instructions provided in the relevant sections of this Guide, as determined based upon the step in the process where the run was previously halted.

If, instead, the recalculate option is being used to reanalyze data that was previously analyzed:

1. Select the detailed stage analysis worksheet that displays the analysis data for the stage whose data is to be reanalyzed (the Stage [x] Curves worksheet, where [x] is the stage number).
2. Click on the Redo Analysis command button to display the relevant analysis dialog. The command button is located at the top of the Stage [x] Curves worksheet, immediately above the charts and to the right of the Raw Data File Name field (see Figure 24(c)).
3. Follow the regular process used to analyze data from a stage of the given stage type. Note that only data from tensile/compression or creep stages may be reanalyzed, since the analysis of data from relaxation stages is entirely automated with no user options. For this reason, no Redo Analysis command button is provided on the detailed stage analysis worksheets associated with relaxation stages.

3.7 Quick Access Toolbar Functionality

As stated in Section 2.0, the custom GRC MILab QAT (Figure 25) provides toolbar buttons that reside on a customized version of the Excel QAT, and thus enable quick access to basic functions that may be required while processing Generic and/or Generic Cyclic test data. The QAT is located either above the Excel menu bar or below the ribbon, as configured by the user. While the QAT does provide quick access to these functions regardless of the individual worksheet currently being displayed, each function is also available on a specific worksheet in the Generic template-based workbook: the ability to unlock (unprotect) or lock (protect) the active workbook, as well as to stop the active test run, via command buttons located in the upper left corner of the stage worksheet, and the ability to display and/or update Generic Cyclic reference block settings, via a command button located to the right of the stress versus strain chart on the Control Curves worksheet and available during Generic Cyclic test runs only.

- Display Reference Blocks (Figure 25(a)):

This command, relevant and available during Generic Cyclic test runs only, is provided to enable the user to view the current reference block settings and, if required, to modify those settings. See Section 4.7.1.2 for additional details.

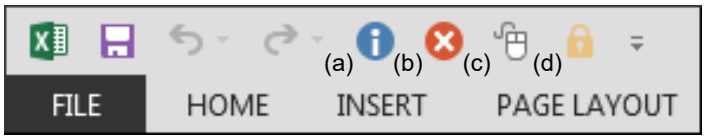


Figure 25.—Custom GRC MILab Quick Access Toolbar. Icons: (a) Display Reference Block, (b) Stop Active Run, (c) Unlock Active Workbook, and (d) Lock Active Workbook.

- Stop Active Run (Figure 25(b)):

As described in a previous section, ensuring that a Generic template-based workbook is left in a consistent state is particularly important if the user should choose to pause a test run prior to completion, and then restart the run at a later time. If Excel is to be used to perform other tasks in the interim, this could inadvertently cause the run to be terminated by Excel; or, if the user should close the workbook and reopen it at a later time, the run would also be automatically terminated by Excel. Either of these actions could result in the workbook being left in an inconsistent state, making it difficult or impossible to restart the run as planned. For this reason, the stop test run feature has been provided, to ensure that the run is stopped in a graceful manner and the workbook left in a consistent state, ensuring that the run can be restarted at a later time, picking up from the previous stopping point.

- Unlock Active Workbook (Figure 25(c)):

By default, Generic template-based workbooks are locked (protected), as are all included worksheets—with the exception of the Additional Information worksheet, and if a test run is in progress, the Control Curves and Supplemental Curves worksheets. This is done to protect against inadvertent changes to the processed data, or any modification to a worksheet that might cause an issue for the software. Therefore, if the user wishes to make a change to any of the locked worksheets, the workbook must first be unlocked using this feature.

- Lock Active Workbook (Figure 25(d)):

As discussed previously, because Generic template-based workbooks are locked by default, if the user wishes to make a change to the workbook, other than on the Additional Information worksheet, the workbook first needs to be unlocked. However, it is recommended to always leave the workbook protected to prevent any inadvertent changes that might cause an issue for the software and to protect against inadvertent changes to the processed data. If the user has unlocked the workbook in order to make a change, it is recommended to use this feature to relock the workbook once any required changes have been made.

3.8 Worksheet-Based Command Button Functionality—Generic Module

As stated previously, stage worksheet command buttons are provided that implement the same functionality as provided by three of the four QAT buttons: the ability to unlock (unprotect) and lock (protect) the active workbook and to stop the active test run. These stage worksheet command buttons are shown in Figure 26.

Note that the fourth QAT button, Display Reference Blocks, is specific to the Generic Cyclic module, and will be discussed in detail, along with other Generic Cyclic-related functionality, in Section 4.0.

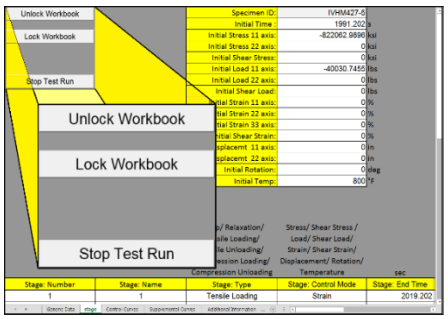


Figure 26.—Command buttons on stage worksheet.

4.0 Processing of Raw Test Data from Generic Cyclic Test

A Generic Cyclic test consists of any number of Generic blocks processed in sequence, with each block consisting of a specified pattern of tensile, compression, creep and/or relaxation test stages, repeated in the same sequence for a specified number of times. The pattern specified may consist of up to 40 stages, combined in any order, other than the first stage, which must be either a tensile or compression loading stage. The steps involved in analyzing data from a Generic Cyclic test are as dexcribed in the following sections.

4.1 Raw Test Data Import

As with a Generic test, for Generic Cyclic test data, the first step in the analysis process is to import raw test data into Excel from the relevant test data file. While Generic test data may be imported either from an ASCII text file or an Excel file, for a Generic Cyclic test, data may only be imported from an ASCII text file. The process to be used to import the raw test data is described here.

1. To initiate the import, click on the MILab add-in custom toolbar Import Text Data button, and a file selector dialog will appear.
2. Navigate to the appropriate directory, select the file containing the raw test data to be analyzed, and click on the Open button. The MILab Datafile Format dialog will then be displayed (Figure 27).
3. Provide the requested user input for the Datafile Format dialog, as well as for the Generic Cyclic Test Specimen Properties dialog (Figure 28), displayed by clicking on the Datafile Format dialog's Specimen Dimensions & Transducer Calibration command button, following instructions provided in Reference 1, Section 2.1, Importing from Text Files.
4. Once all of the input has been provided, click the Datafile Format dialog's OK command button to dismiss the completed text import dialog and open a template-based Excel file where the imported data will be displayed upon completion of the data import process, with the new file named by default, [raw_test_data_file_name].xlsm. As described in Section 3.0, if a file with the same file name is found to already exist in the current directory, a message dialog will be displayed providing the user with the option of overwriting the previously existing file, renaming the file currently being opened, or canceling out of the import process entirely.
5. If continuing the data import process, the Generic Cyclic Test Information dialog will next be displayed (Figure 29). This dialog is used to provide Generic Cyclic test information such as the control mode, stress or strain range, frequency, etc., and to specify the yield offset values that are to be calculated. While not required, if provided, the requested input will be used during processing of each cycle's data to initialize related settings, as well as to document the associated values in the Excel file, ensuring subsequent upload to the database during the upload process.
6. After providing the requested input on the Generic Cyclic Test Information dialog and clicking on the OK command button to dismiss the dialog, the Test Specification dialog (Figure 9) will be displayed. Providing the requested input is required, as it is used to determine record placement when uploading the analyzed data to the database. Once the requested input has been provided, click on the Test Specification dialog's OK button to complete the data import process.

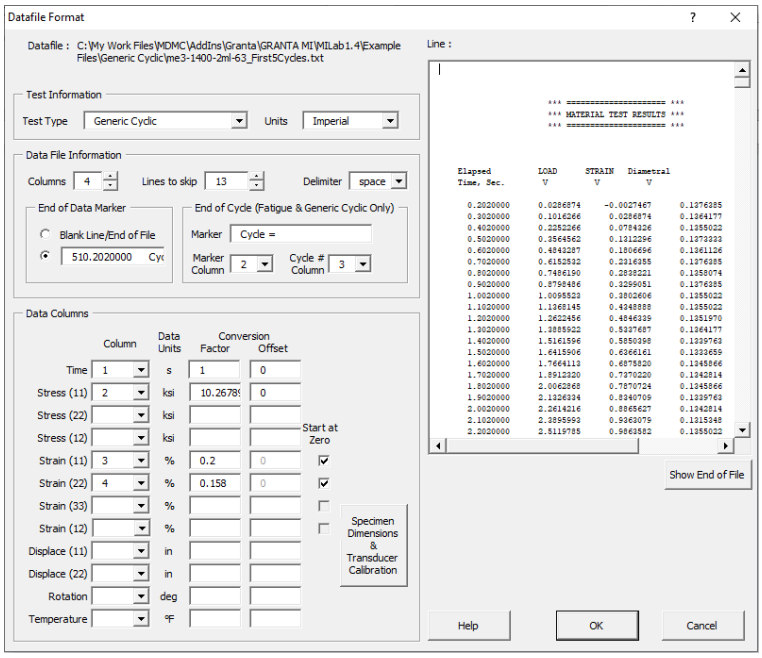


Figure 27.—Datafile Format text import dialog.

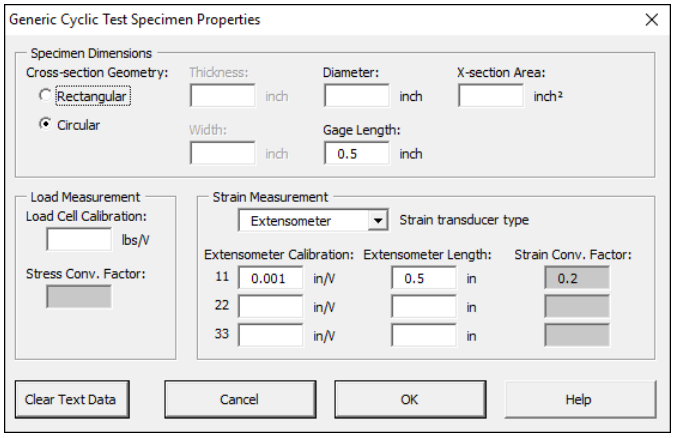


Figure 28.—Generic Cyclic Test Specimen Properties dialog.

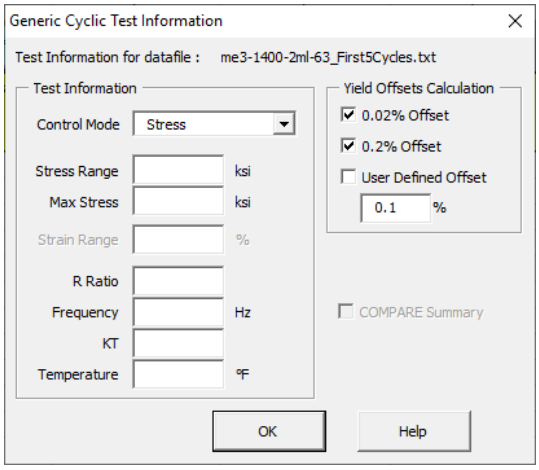


Figure 29.—Generic Cyclic Test Information dialog.

4.2 Setting Initial Conditions

Immediately following data import, the next step in the process is to provide initial conditions input. Unlike during a Generic Test run, for Generic Cyclic test data, the Initial Conditions dialog is automatically displayed immediately following data import and prior to the user having direct access to the Excel file worksheets. The dialog nominally is displayed for each cycle of imported data, but with an option provided, as described in the following paragraphs, to apply the input to more than one cycle, if appropriate.

The Initial Conditions dialog displayed during Generic Cyclic test runs (Figure 30) is nearly identical to the equivalent dialog displayed during Generic Test runs, described in Section 3.0. For Generic Cyclic test runs, the # Stages text box on the Generic Test version of the dialog has been replaced by a command button used to display the Cycle Stage Specifications dialog (Figure 31), and the Cancel command button is disabled. For Generic Cyclic test runs, providing the ability to cancel the dialog would unnecessarily complicate processing while providing no added value, since no further progress is possible without specification of the requested input for each cycle.

The first time the initial conditions dialog is displayed, the values displayed are the default values associated with Cycle 1, as depicted in Figure 30. Providing updated values for this dialog is accomplished in the same manner as described previously for updating initial conditions input during the processing of Generic test data. However, in addition to the parameters displayed on the initial conditions dialog itself, the number of stages per cycle and other cycle-specific input required for the processing of each cycle's data must also be provided. The Cycle Stage Specifications dialog is provided for this purpose and is displayed by clicking on the initial conditions dialog's Provide Cycle Stage Specifications command button, as shown above for Cycle 1. Providing the requested input is accomplished as follows:

1. Enter the number of stages included in the first cycle. The number entered should reflect the number of stages for which any imported data exists, regardless of whether all the data points required to analyze a particular stage have been imported.
2. Once the number of stages has been specified, the list box immediately below the # Stages text box will be populated with a list of the specified stages, with each stage preceded by a check box. Click the check box next to each stage that is to be analyzed, checking the check box. Alternatively, if all stages in the cycle are to be analyzed, clicking the Analyze Every Stage check box located immediately below the list box will mark all identified stages to be analyzed. If, on the other hand, imported data for a given stage reflects only a partial stage such that the stage should not be analyzed, or if for any other reason a stage should not be analyzed, leave the check box unchecked.
3. If the current cycle represents the first cycle in a block of cycles for which the test profile is the same, that is, if subsequent cycles, but not all remaining cycles in the test, have the same number of stages per cycle, with an identical order of tensile and/or compression loading or unloading, creep, and/or relaxation stages, and the method used during the test to determine the length of each corresponding stage is the same for each of those cycles (i.e., it would result in the same relative stage end point being selected), click the check box to the left of the text, Set All Cycles the Same through Cycle:, and then click the dropdown arrow for the associated dropdown box, as shown in Figure 32. The list of remaining cycles in the test will be displayed. Select the last cycle for which the test profile is identical to the test profile for the current cycle. This will then automate the initialization process for each of the included cycles, eliminating the display of, and need to provide user input for, either the initial conditions or Cycle Stage Specifications dialog for each of those cycles.
4. If, on the other hand, all remaining cycles in the test have the same test profile as the current cycle, click on the check box immediately to the left of Set All Remaining Cycles the Same. This will automate the initialization process for all subsequent cycles, eliminating the display of, and need to

provide user input for, either the initial conditions or Cycle Stage Specifications dialog for all remaining cycles.

5. If, however, the current cycle has a different test profile from subsequent cycle(s), for example, if the current cycle has a stage that cannot be analyzed due to a lack of complete data being available, whereas the corresponding stage in one or more of the immediately subsequent cycles has all the required data and is to be analyzed, or if using the identical method to determine the length of a stage in the current cycle would not result in the correct stage end point being selected for the corresponding stage in one or more of the immediately subsequent cycles, then steps 3 and 4 of this process should be skipped.
6. Finally, if the current cycle, or each cycle in the set of identical cycles identified as belonging to the same block, includes more than one tensile or compression load stage and at least one subsequent tensile or compression unload stage, elastic and plastic strain range (ESR and PSR) values will only be calculated for one load and unload combination of stages during each cycle. Therefore, user input is required to indicate which load stage should be paired with the first unload stage when computing ESR and PSR values. If the load stage that precedes the first unload stage should be used for the calculation, the "Cycle(s) Include Special Case Stage 1 Load Stage" check box should be unchecked. If instead the first unload stage should be paired with the second load stage to compute ESR and PSR values, (i.e., the load stage that follows the first unload stage should be used for the calculation) the "Cycle(s) Include Special Case Stage 1 Load Stage" check box should be checked. If the current cycle, or each cycle in the set of cycles in the block, being considered does not have more than one tensile or compression load stage and at least one subsequent tensile or compression unload stage, the "Cycle(s) Include Special Case Stage 1 Load Stage" check box is ignored, and so may be left checked or unchecked.
7. If, at any point in this process, viewing a plot of the cycle's data would be helpful in determining the user input to provide, for example, to assist in the process of determining the correct number of stages to specify, a View Chart Data command button is provided on both the Initial Conditions and the Cycle Stage Specifications dialog. The button may be used to display the Modify Display Settings dialog and plots of the cycle's data. The dialog (see Figure 13) can be used to scroll and/or zoom the display, as needed, as well as to switch between the two worksheets used to display test data plots (for tests with valid data available for display on both worksheets). Once finished viewing the plotted data, the Done (Close Window) command button may be clicked to close the dialog and return to the initiating user input dialog.
8. Once all of the required input on the Cycle Stage Specifications dialog has been provided, the OK command button may be clicked to close the dialog and return to the Initial Conditions dialog. If, upon clicking the OK command button, the number of stages specified by the user is determined to be the same as the number of stages specified for a previously defined cycle or block, a message is displayed asking the user to indicate whether the current cycle should be marked as the start of a separate block or as a continuation of the relevant prior block (see Figure 33). As expressed in the message text, responding No to mark the current cycle(s) as a continuation of a prior block should only occur if the current cycle(s) test profile is identical to that of the prior block, that is, if the sequence of stage types, whether or not each stage is to be analyzed, and the method used during the test to determine the stage end point for each of the corresponding stages are all the same in all cases. For example, the current cycle(s) may be considered a continuation of a prior block if it is the case that each relative stage in each cycle is the same stage type (e.g., creep, relaxation, tensile loading, etc.) as the corresponding stage of the previous block's cycle(s); if during the test, the same method is to be used to determine the length of each corresponding stage (e.g., if, for some of the stages, the stage is terminated, with the test proceeding to the next stage, based on the same amount of time elapsing in both cases; and, for the remaining stages, based on the strain value changing by the same

amount in both cases); and if all stages in the current cycle(s) are marked the same as the corresponding stages in the prior block's cycle(s) when identifying whether or not a stage is to be analyzed (i.e., if stage 1 is marked to be analyzed in both the prior block's cycle(s) and the current cycle(s), or stage 1 is marked to not be analyzed in both cases, etc.).

9. After clicking the Cycle Stage Specifications dialog's OK command button to dismiss the dialog and return to the Initial Conditions dialog, if all required input has been provided for both dialogs, clicking the Initial Conditions dialog's OK command button will dismiss the dialog. Processing will then continue with either automated initialization of subsequent cycles and/or the display of the Initial Conditions dialog for the next cycle which represents the first cycle of a separate block, as determined based upon the previously provided user input. If user input is required for one or more subsequent cycles, the previous steps should be repeated for each such cycle.
10. If, at any point while providing initial conditions and cycle stage specification input, the user attempts to dismiss the initial conditions dialog when the input on either dialog has been determined to be incomplete, an error message will be displayed identifying the missing input, and the user will be returned to the current dialog, to enable the user to provide the required input.

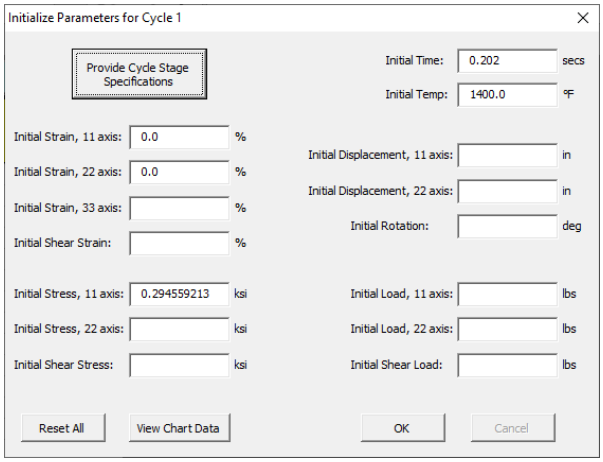


Figure 30.—Initial Conditions dialog, as displayed during Generic Cyclic test runs.

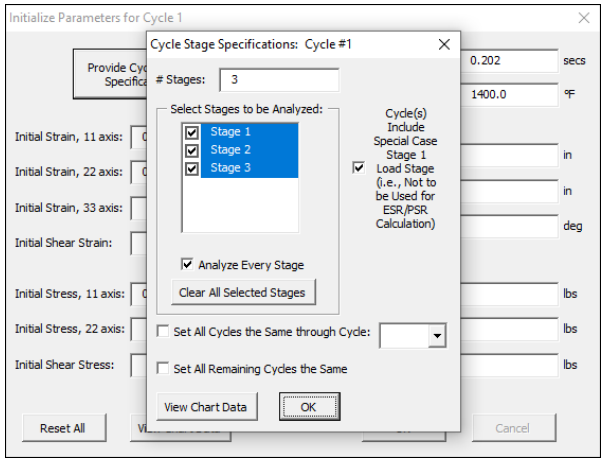


Figure 31.—Cycle Stage Specifications dialog, displayed via Initial Conditions dialog.

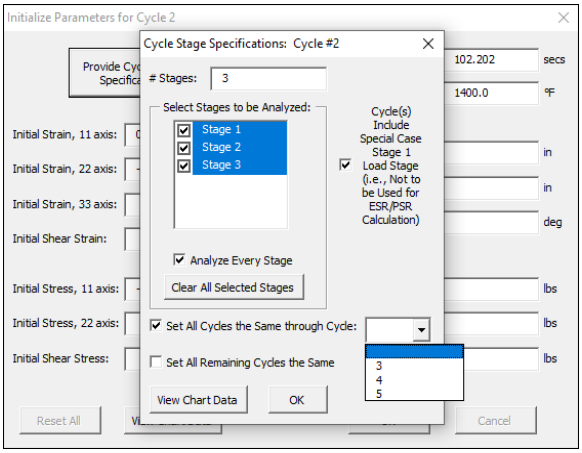


Figure 32.—Cycle Stage Specifications dialog for five-cycle test with "Set All Cycles the Same through Cycle" check box checked and associated dropdown list displayed.

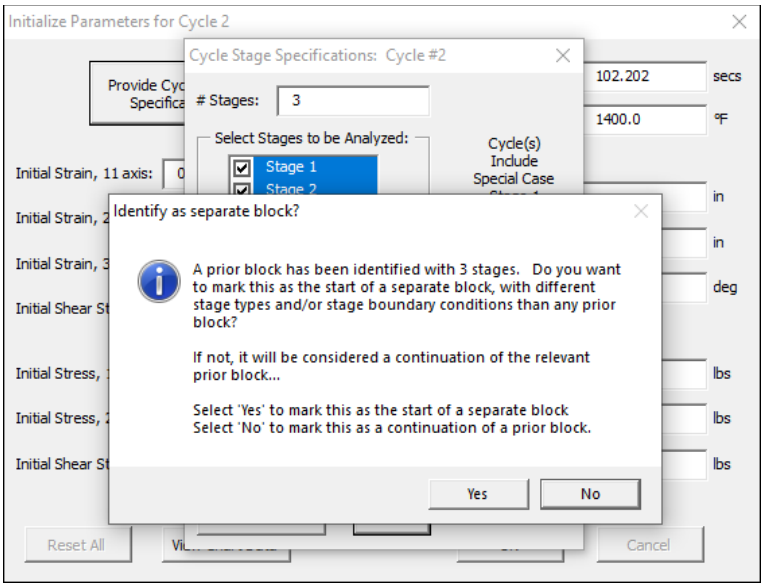


Figure 33.—Identify as Separate Block message.

4.3 Stage End Point Definition

Once the initial conditions and cycle stage specification input has been provided for all imported cycles, the next step in the process is to define stage end points for each cycle included in the test. For Generic Cyclic test runs, stage end points must be manually specified by the user for each individual cycle that has been identified as the first cycle of a separate block. For the default case, where the test profile (i.e., number of stages, order of stage types, method used during the test to determine the length of corresponding stages in each cycle, and whether or not each corresponding stage is to be analyzed) is the same for all cycles in the test, stage end points need only be manually specified for the first cycle of the test. Once that has been accomplished, stage end points for all subsequent cycles may be determined in an automated fashion, based upon the input provided by the user during the manual stage end point specification process for the first cycle's stage end points.

4.3.1 Graphical Identification of Stage End Points (Optional)

As with the identification of stage end points during Generic tests, during Generic Cyclic tests, those stage end points being manually specified, that is, the stage end points for the first cycle of each block, may optionally be defined graphically before being completely specified via the Specify Stage Parameters dialog. The process used to define cycle stage end points graphically is identical to the process for graphical identification of stage end points during Generic tests and is described in detail in Section 3.3.1. Note that, to perform the stage end point identification for a given cycle of a Generic Cyclic test, however, the relevant cycle must first be selected using the cycle selection dropdown box on the Cycle Data worksheet.

4.3.2 Stage End Point Parameter Specification via User Input Dialog

As during Generic tests, graphical identification of stage end points is an optional first step that may be used to facilitate the identification of stage end points in the first cycle of each defined block of a Generic Cyclic test. Cycle stage end point specification via the Specify Stage Parameters dialog is, in contrast, required, in order to specify (in the case where graphical input has not been provided) or update and finalize (when stage end points have been initially identified graphically) stage-related parameter values for each such stage. The process used for this during Generic Cyclic test runs is similar to that used

during Generic tests, as described in the corresponding subsection of Section 3.0. However, for Generic Cyclic tests, an additional step is required, in order to provide the user input necessary to automate the identification of corresponding stage end points in subsequent cycles from the same block. Without this additional input, the user would be required to manually specify each stage end point in each cycle in the test before proceeding to the analysis. The process used to provide the required input is as follows:

1. Using the cycle selection dropdown box on the Cycle Data worksheet, select the cycle whose stage end points are to be manually identified.
2. As in the case of Generic test runs, click on the Specify Test Stage Data command button on the stage worksheet (Figure 18) to display the Specify Stage Parameters dialog (Figure 34), and provide the same input as described for Generic tests.
3. Only after providing Control Mode and Target Value Row values on the Specify Stage Parameters dialog, as well as any other relevant text box input, click on the "Apply Settings to Corresponding Stage of Each Cycle in Block" command button, located immediately below the Notes text box. An additional dialog, with the caption, Stage Target Settings for Remaining Cycles, as shown in Figure 35 will be displayed. The dialog will be initialized with default values for each setting, as determined based on the Specify Stage Parameters user input provided for the stage, as well as corresponding data on the Generic Data worksheet. In general, the default settings should be acceptable as is, with the most likely exception being during creep or relaxation stages and/or when the selected Target Parameter should be time. If the default values displayed are acceptable as is, click the OK command button to accept the settings and close the dialog; if not, update the settings as required before clicking the OK command button to close the dialog. Note that, in most cases, the value specified in the Target Parameter Value text box may be specified as either an absolute or relative (delta) value, as determined by setting the Target Type text box value to either Absolute (Actual) Value or Relative (Delta) Value. Either option is available for all Target Parameter values except time, in which case the Target Type value will be automatically set to Relative upon selection of the associated Time Target Parameter. As mentioned previously, stages for which the appropriate Target Parameter selection is time are the stages where the Target Parameter setting is most likely to require explicit specification by the user, that is, where the default value upon display of the dialog is most likely to be incorrect and require an update by the user. If an update is required, after ensuring that the Target Parameter and/or Target Type values are properly set, the Copy Target Value from Worksheet command button may be used to select the relevant value to be used in determining the Target Parameter Value and default Error Tolerance settings. If using this method to update the values, any relevant delta values will be calculated by the software and the text boxes automatically updated based on the value selected by the user on the Generic Data worksheet, although a subsequent manual override by the user is always possible.
4. Once satisfied with the input provided, click on the dialog's OK command button to exit and return to the main dialog. After ensuring that the "Apply Settings to Corresponding Stage of Each Cycle in Block" command button is depressed (see Figure 36), and that all other user input is as desired, click the main dialog's OK command button to exit the dialog, at which point all stage parameter values will be computed by the software and written out to the relevant row of the stage worksheet.

As in the case of Generic test runs, it is also possible to exit the dialog without providing the required input by clicking the dialog's Cancel command button. As before, a warning message will be displayed asking the user to acknowledge that, if they proceed, processing will be paused until the associated input is provided. Clicking Yes will result in the Specify Stage Parameters dialog being closed, as requested, while clicking No will return the user to the dialog and permit additional input to be provided or enable the user to accept the existing input by clicking the OK command button.

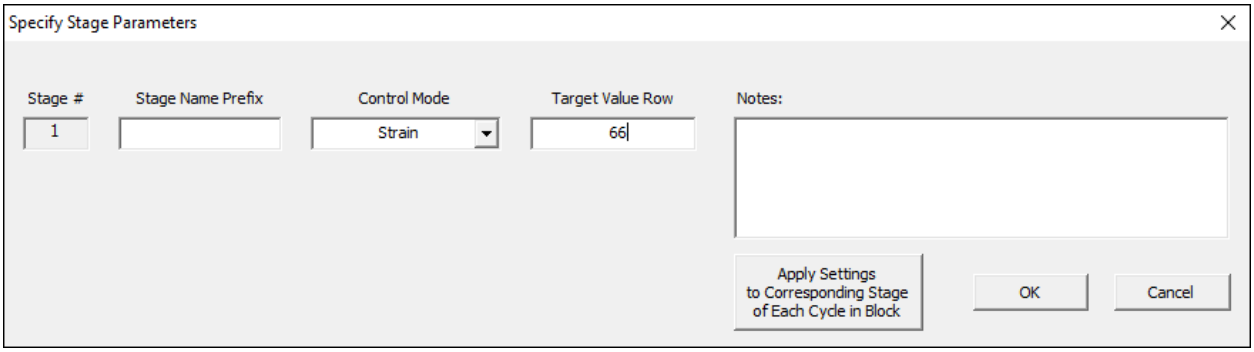


Figure 34.—Specify Stage Parameters dialog displayed during Generic Cyclic test runs.

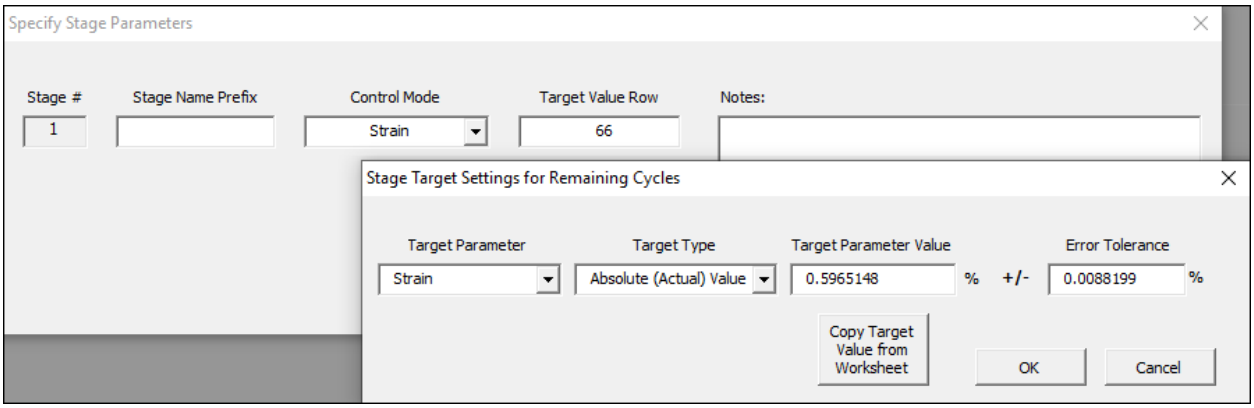


Figure 35.—Dialog used to provide target value settings for automated cycle stage definition.

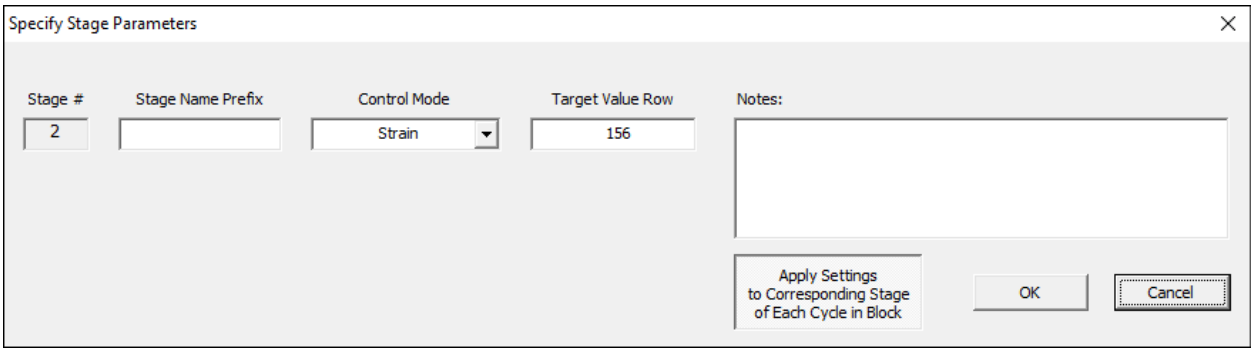


Figure 36.—Specify Stage Parameters dialog with Apply Settings command button depressed, indicating target parameter specification has been completed.

4.3.3 Manual Update to Stage Data

As described previously for Generic test runs, although most stage data values cannot and should not be manually modified by the user, the one exception to this requirement is the value output to the Stage: Type column of the stage worksheet. Because the stage type value is determined by an algorithm implemented in the software, it should generally provide the correct value. However, it is not guaranteed to do so. It is, therefore, possible for the user to manually override the stage type value, provided it is done during the stage specification process. See Section 3.3.3 for additional details on this topic, as well as images of the associated screen display.

4.3.3.1 Deleting Stage End Points

If, at any time prior to beginning automated stage end point specification for a block, it is determined that the manually specified location for a stage end point from the first cycle of the block, or any of the associated input for that stage, is not accurate, the stage end point may be deleted so that it can subsequently be respecified. The process used for this is the same as that used to delete stage end points during Generic test runs. See Section 3.3.3.1 for detailed information on this topic.

4.3.3.2 Inserting Stage End Points

Similar to stage end point deletion, if at any time prior to beginning automated stage end point specification for a block, it is determined that an additional stage end point is required that is prior in time to an already identified stage end point (this is most likely to occur after an incorrectly specified stage end point has been deleted and then needs to be added back in with the correct parameters), a new stage end point may be inserted using the same process as described in Section 3.3.3.2. See that section for detailed information on this topic.

4.4 Automated Stage End Point Specification

As stated in the description of Section 4.3, stage end points for the first cycle of each defined block must be manually identified by the user, optionally utilizing the Control Curves worksheet plots as an initial step and completing the process via the Specify Stage Parameters dialog. Once this has been done, the caption on the stage worksheet command button used to display the Specify Stage Parameters dialog will change from “Specify Test Stage Data” to “Begin Analysis.” At this point, stage end point definition for all remaining cycles may be performed in an automated fashion, facilitating the process of identifying the remaining stage end points. To begin, the user must click the Begin Analysis command button, at which point, the identification process will begin, with the lower left corner of the Excel window’s status bar displaying progress as each cycle is processed. Once all stage end points have been identified, the Input Complete dialog will be displayed (Figure 37), indicating that the analysis may begin, and asking the user to indicate whether to immediately start the analysis. If the user responds by selecting Yes, the analysis will begin, and the appropriate analysis form, as required for the first stage of the first cycle to be analyzed, will be displayed. If the user selects the dialog’s No option, the Input Complete dialog will close, and the run will remain in a paused state until the user initiates the analysis by clicking on the stage worksheet Begin Analysis command button and responding Yes to the Input Complete dialog prompt.

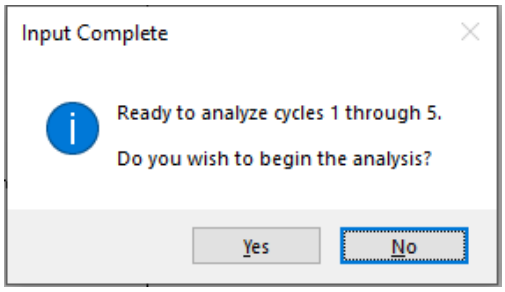


Figure 37.—Input Complete dialog.

4.5 Performing Analysis

Once the stage end point specification process has been completed for all stages of the first cycle of each defined block and the subsequent automated stage end point identification process completed, as described previously, the Input Complete message dialog shown in Figure 37 will be displayed. At this point, if the user clicks the Yes command button, the message dialog will close, and the analysis process will begin. As in the case of Generic test runs, the first step in this process will be to create and add to the workbook a new worksheet, the Stage [x] Curves worksheet, with [x] representing the stage number, followed by display of the dialog to be used to provide the required input for the analysis. Note that this first step will result in a slight, but noticeable, delay before being able to proceed. In addition, while the first worksheet added will typically be the Stage 1 Curves worksheet, which must by definition be a tensile or compression loading stage, this may not always be the case. If, as described in Section 4.2, not all stages were marked by the user for analysis, then the first worksheet added to the workbook and displayed to the user will instead be the worksheet for the first stage that was marked for analysis during the run initialization process.

Once the stage-based analysis worksheet has been added to the workbook and the analysis input dialog displayed, the user may update the dialog's default settings and click the Calculate button to display the results, enabling the user to review the output, revise the input as necessary, and click the Calculate button again until satisfied with the results. The output displayed will include both detailed analysis data and any associated plots, and for each stage, the specific worksheet format, type of data output, input dialog used to provide the required analysis input, and type of input required will be based upon the type of stage being analyzed (tensile/compression, creep, or relaxation).

For additional information on the individual stage analysis input dialogs, see Reference 1. While there are minor differences in implementation between the original versions of the dialogs and the versions implemented in the Generic Cyclic module, there is also a significant amount of overlap, and many relevant details are available in that document. Note that information relevant to the tensile/compression analysis dialog may be found beginning on page 18 of Reference 1 in the Tensile Test Data section (Section 3.1), and information relevant to the creep stage dialog is located beginning on page 24 in the Creep Test Data section (Section 3.3). Analysis of data from relaxation stages is entirely automated in the Generic Cyclic module, so there is no associated analysis input dialog.

Once the analysis of data from the current stage has been completed, clicking the analysis input dialog's OK command button will bring up a warning dialog (Figure 38), asking the user to confirm that they intend to finalize the analysis for the current stage and proceed to the next stage in the cycle. As seen in Figure 38, the Cancel button is the default selection for the warning dialog, that is, it will be the option selected if the user closes the dialog without making an explicit selection. If the Cancel option is selected, the warning dialog will be removed and the user returned to the existing analysis input dialog, to continue the current stage analysis process. This prevents the user from inadvertently finalizing the analysis of data from the current stage and progressing to a subsequent stage due to mistakenly clicking the OK command button when the Calculate button should have been used instead. Were that to occur, it could only be corrected by restarting the entire analysis process, which would require canceling out of the run, closing the workbook without saving any updates, and then reopening the workbook and restarting the run (see Section 4.6 for additional details on restarting a run). To instead finalize the analysis results for a given stage, after clicking the analysis input dialog's OK command button, the user must also click the warning dialog's OK command button, which will result in both the warning dialog and the analysis input dialog for the current stage being removed, and the entire process described here repeated for the next tensile/compression or creep stage in the cycle. Note that, because the analysis of data from relaxation stages is entirely automated, the user will not see the data output from relaxation stages during the

analysis process, that is, from a user interaction standpoint, relaxation stages will be skipped. The analysis results from relaxation stages will, therefore, be viewable only after the run has completed.

After completing the analysis of all stages in the first cycle marked for analysis and removal of the analysis input dialog for the final analyzed stage in the cycle, the dialog shown in Figure 39 will be displayed, asking the user whether to automate the analysis of all remaining cycles in the block by using the settings provided during the analysis of data from the current cycle. Selecting Yes will automate the analysis, enabling those cycles to be analyzed without requiring any further input from the user. Selecting No will instead require the user to complete the analysis input dialog prior to the analysis of each stage of each subsequent cycle in the block. Additionally, if the test profile consists of more than one block, and the option that would be selected upon display of the dialog for future blocks is the same as the selection made for the current block, checking the "Do not display this dialog again" check box will eliminate future dialog display and the need for the user to respond following the manual analysis of the first cycle of each remaining block.

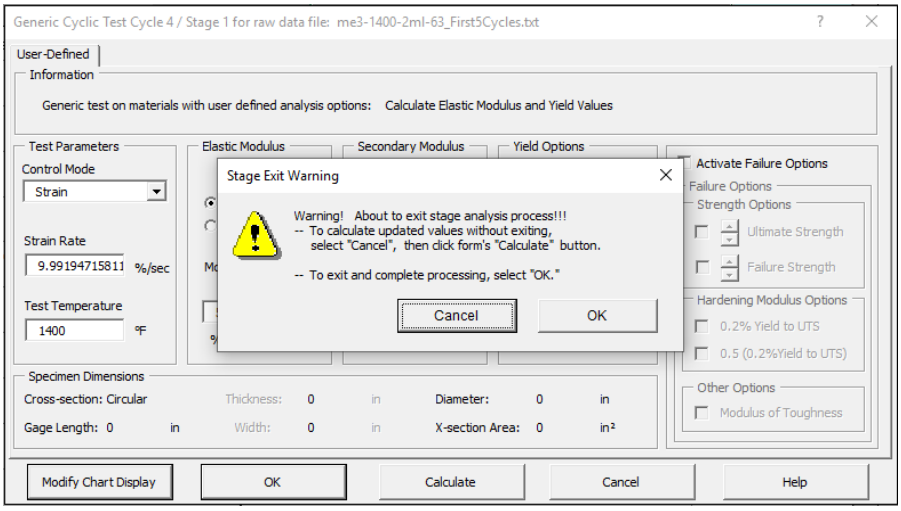


Figure 38.—Stage Exit Warning dialog.

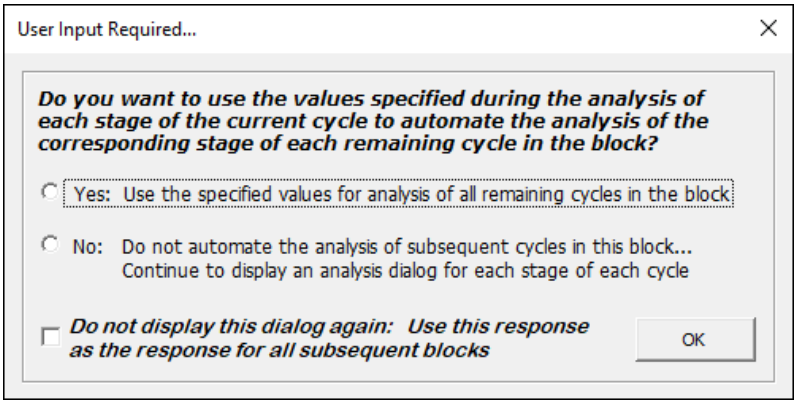


Figure 39.—Automate Analysis of Future Cycles? dialog.

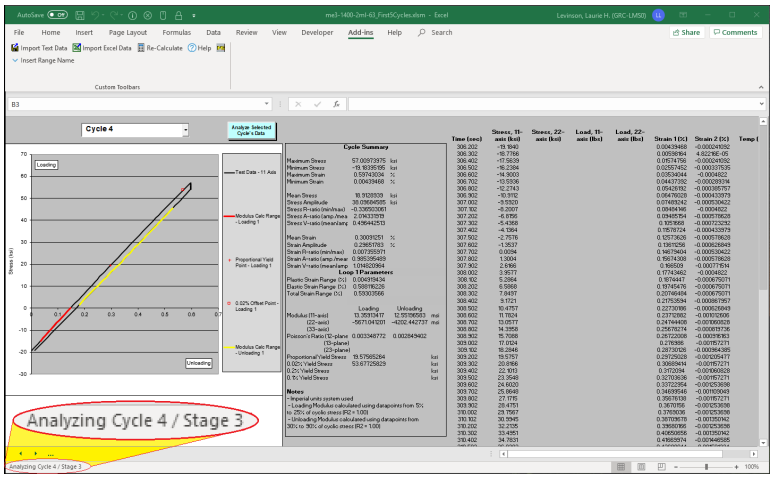


Figure 40.—Status bar updates during analysis.

During the analysis of each cycle, as the analysis process progresses, the Excel window's status bar will periodically update to indicate the cycle and stage currently being processed (Figure 40). During this process, whenever Excel's memory usage approaches its limit, the number of test stages processed since last recovering memory exceeds the number of stages that can be processed without risk of exceeding the memory limitations, or after the last stage of the cycle has been processed and prior to beginning the analysis of data from the next cycle, all detailed analysis worksheets added to the current, or "master," workbook up to that point and still included in the workbook will be exported to a separate workbook, named as follows:

[master_workbook_name]_Stages_[first_exported_stage]_thru_[last_exported_stage]_CI-[first_exported_cycle_index]_Thru_CI-[last_exported_cycle_index].

Each exported worksheet will then be deleted from the master workbook, enabling the associated memory to be recovered, and permitting Excel to handle any specified number of stages and/or cycles without running out of memory. This export process, however, being extremely I/O-intensive, does result in additional processing overhead. Therefore, there is likely to be a noticeable slowdown in the analysis process each time worksheets are being exported. In addition, although at present, a maximum of only one cycle is being exported to each workbook containing the detailed analysis results, the software has been implemented so as to provide for the possibility of more than one cycle being output to each file at some future point in time. The naming convention has therefore been defined to permit this possibility. As of the present time, however, given that the detailed analysis results from, at most, only one entire cycle will be included in each additional workbook, the [first_exported_cycle_index] and [last_exported_cycle_index] values will always be the same.

As described previously for the stage end point definition process, for Generic Cyclic test runs with test profiles consisting of more than one block, the analysis of data from the first cycle of each block must be performed manually. (See the Section 4.0 introductory paragraph for the general definition of a block, as well as the detailed example provided in Section 4.2 step 8, which describes the specific factors used in distinguishing distinct blocks.) As a result, when performing the analysis of data from test runs with multiple blocks, after proceeding through the automated analysis of data from each cycle in the current block, when the first cycle of a distinct block is reached, the analysis input dialog for the first stage to be analyzed will be displayed, and processing will pause to wait for the required user input, as detailed previously.

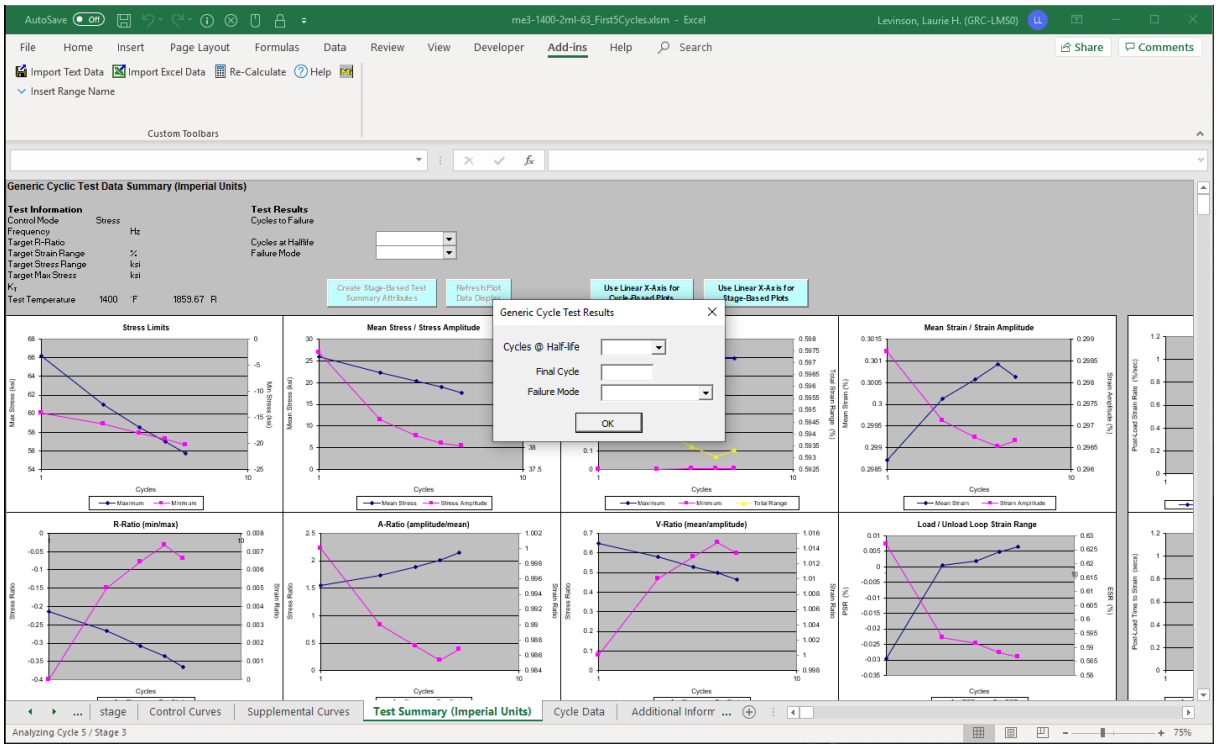


Figure 41.—Generic Cyclic Test Results dialog.

Once the imported data from all cycles has been analyzed, the Generic Cyclic Test Results dialog (Figure 41) is displayed, requesting the user provide Cycles @ Half-life, Final Cycle, and Failure Mode values. Cycles @ Half-life and Failure Mode will be specified via a list of dropdown box options, with Cycles @ Half-life being a selection from the list of cycles analyzed, and Failure Mode being a selection from Failed in gage, Failed outside gage, Run-out, or Test Stopped. Final Cycle is provided via text box input, so may be any numeric value provided by the user. In each case, the input provided will be used to update the Test Summary (Imperial Units) or Test Summary (Metric Units) worksheet, with Final Cycle and Failure Mode values output as text to the appropriate cell of the worksheet, and Cycles @ Half-life used to identify the corresponding row of the worksheet's Tensile/Compression Stage Results table, to display the associated values in bolded font.

Once the Generic Cyclic Test Results dialog has been completed by the user and dismissed, the Save Workbook? dialog (Figure 42) will be displayed, indicating that the analysis has completed and prompting the user as to whether the current workbook should be saved. If the user chooses the Yes option, the file will be saved, the dialog will be dismissed, and the test run will be completed. Because the master workbook is a template-based workbook with embedded software logic, whichever option is selected (Yes or No) Excel will always consider the file to have been modified when the user later attempts to close the file, regardless of whether any actual changes have in fact been made. Therefore, Excel will prompt the user, asking whether to save the changes. If the user chose the Yes option in response to the Save Workbook? dialog and has made no changes to the file following completion of the run, there is no need to save the file again in response to the Excel prompt. The user may therefore safely select the Don't Save option, and all analysis results will still be preserved. However, if the user selected the No option in response to the Save Workbook? dialog, the test run will have exited without saving the updated file. In that case, the user will need to explicitly save the file before closing it, or the analysis results will not be preserved, and the file will revert to the state it was in immediately prior to the start of the analysis. See Section 5.1 for additional detail.

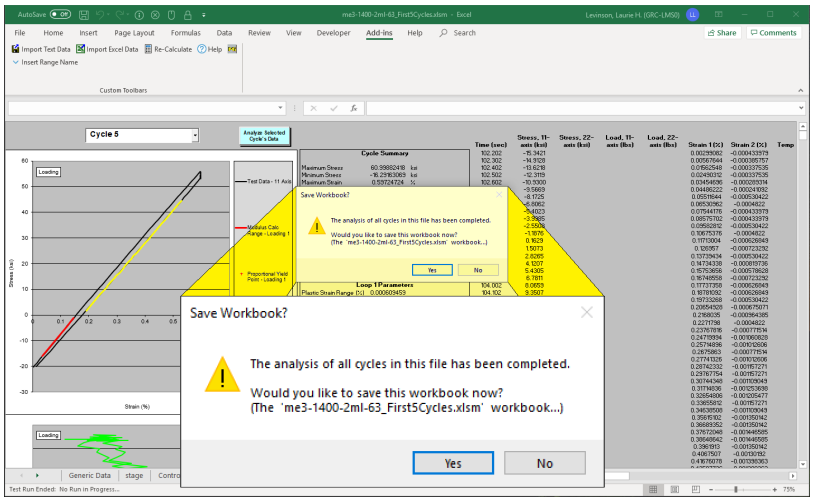


Figure 42.—Save Workbook? dialog.

4.6 Recalculate/Reanalysis Functionality

The Generic Cyclic recalculate and reanalysis functionality described in this section applies to two distinct scenarios:

- The run was stopped prior to completion and needs to be restarted in order to continue.
- After completing the analysis of all cycles using analysis settings specified by the user for the first cycle of each block, and then automating the analysis of all other cycles by utilizing the first cycle settings to analyze all subsequent cycles in the block, one or more cycles need to be reanalyzed to enable the user to customize the analysis input settings and obtain analysis results more tailored to the specific cycle(s).

In either case, prior to beginning, the Generic Cyclic master file whose data is to be analyzed or reanalyzed must first be open in Excel and be the active file. The process to use should then proceed as follows:

If the recalculate option is being used to continue the initial analysis of a run that was stopped prior to completion, select the Add-Ins menu item from the Excel menu bar and left-click on the MILab add-in custom toolbar's Re-Calculate button (see Figure 6). The cursor will change from an arrow cursor to a processing indicator (a rotating "O") while the test run is being reinitialized. When the required processing has completed, the cursor will change back to the default cursor, and the stage worksheet will be the active worksheet. Please wait for this to occur before attempting to proceed. Once the reinitialization has completed and the stage worksheet has been displayed, follow the instructions for the processing of Generic Cyclic data provided in the preceding relevant section(s), as determined based upon the step in the process where the run was previously halted.

If the recalculate option is being used to reanalyze data that was previously analyzed, proceed as follows:

1. Click on the Excel tab for the Cycle Data worksheet to display the Cycle Data worksheet.
2. Using the Cycle Selection dropdown box in the upper left corner of the worksheet (Figure 43), select the cycle to be reanalyzed, waiting for the cursor to change from the processing indicator back to the default cursor before proceeding.

3. Once the default cursor is again displayed and the Cycle Data worksheet has been updated with the relevant cycle's data, click on the Analyze Selected Cycle's Data command button to the right of the Cycle Selection dropdown box (Figure 44) to initiate the reanalysis process, waiting for the appropriate analysis input dialog to be displayed before proceeding. Note that there will likely be a noticeable delay before the dialog appears, as the individual stage analysis worksheets for the cycle being analyzed must first be imported back into the master file from the corresponding detailed analysis workbook where they permanently reside before the analysis can continue. If, for any reason, the corresponding detailed analysis workbook cannot be found, a message will be displayed indicating that the stage sheets workbook was not found (Figure 45). This will typically be due to the user renaming the master file following the initial run, either doing so outside of Excel, such that the master file name no longer matches the detailed analysis workbook(s) file name prefix; or, if done from within Excel, choosing not to automatically rename the associated detailed analysis workbook file(s) when prompted to do so during the master file renaming process. If this should occur, upon clicking the OK command button in response to the Worksheet Import Failure message, a file browser dialog will open (Figure 46), enabling the user to either select the appropriate file and click Open to continue, or click the dialog's Cancel button to cancel out of the reanalysis process. If the Cancel button is selected, the file browser dialog will close, and a confirmation dialog will be displayed (Figure 47), asking the user to confirm that they would like to exit. Choosing Yes from the confirmation dialog will close the dialog and cancel the reanalysis. In addition, prior to exit, the Worksheet Import Failure message dialog will once again be displayed, confirming the reason for the exit and the name of the directory that triggered the error, that is, the directory that was missing the required file (Figure 48). Choosing No from the confirmation dialog will instead redisplay the file browser dialog, providing the opportunity once again for the user to identify the required stage sheets workbook file(s).
4. If continuing the reanalysis process, once the detailed stage analysis worksheets have been imported from the stage sheets workbook and the analysis input dialog displayed for the first stage to be reanalyzed, the reanalysis is carried out in the same manner as detailed previously for the initial analysis of the first cycle of each block, with the user updating any relevant settings on each analysis input dialog as required to perform the modified analysis. At any point in the reanalysis process, however, if the user wants to cancel out of the reanalysis, it is possible to exit by clicking the Cancel button from any analysis input dialog. Doing so will bring up a warning message (Figure 49) requiring the user to first confirm the request before continuing. This prevents any inadvertent cancellation of the reanalysis process due to clicking an incorrect command button on the analysis input dialog. After confirming the cancel request by clicking the warning dialog's Yes command button, all detailed analysis worksheets that had been imported will be reexported back to the appropriate detailed analysis workbook(s), with all values from the previously completed analysis restored prior to export.

Note that, although it is unnecessary to do so, it is also possible to first restart the run using the MILab add-in custom toolbar's Re-Calculate button prior to reanalyzing a cycle's data. If this is done, once the cursor changes back from the processing indicator to the default cursor and the stage worksheet has been displayed, the user should follow the steps as listed previously to reanalyze the relevant cycle's data.

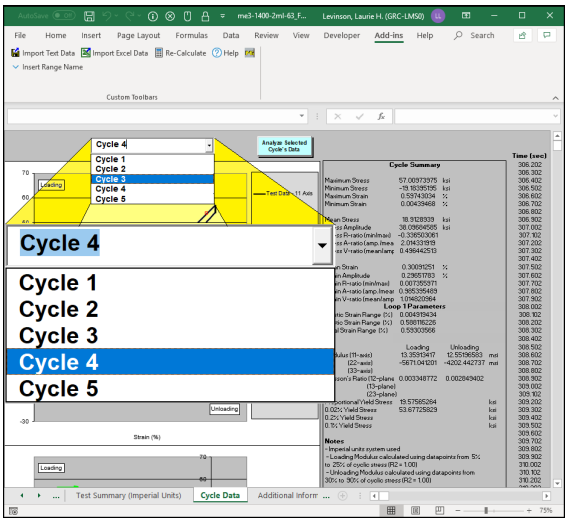


Figure 43.—Cycle Selection dropdown box.

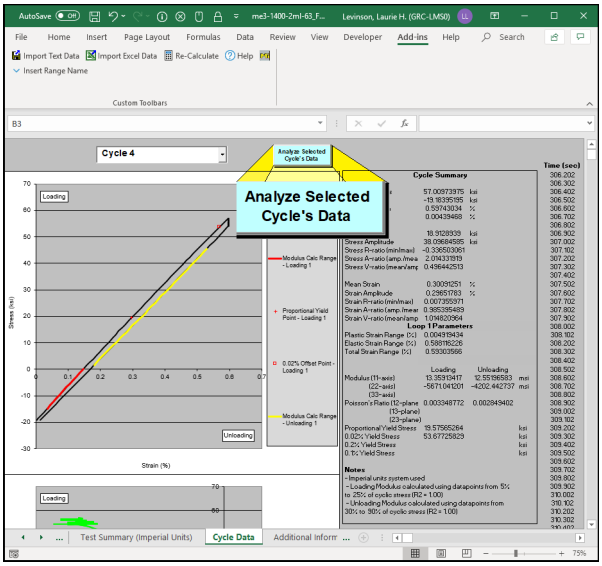


Figure 44.—Command button used to initiate reanalysis of selected cycle's data.

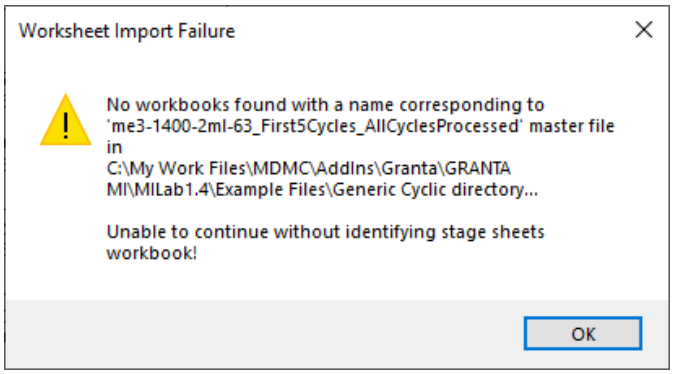


Figure 45.—Warning message indicating master workbook and stage sheets workbook file name mismatch.

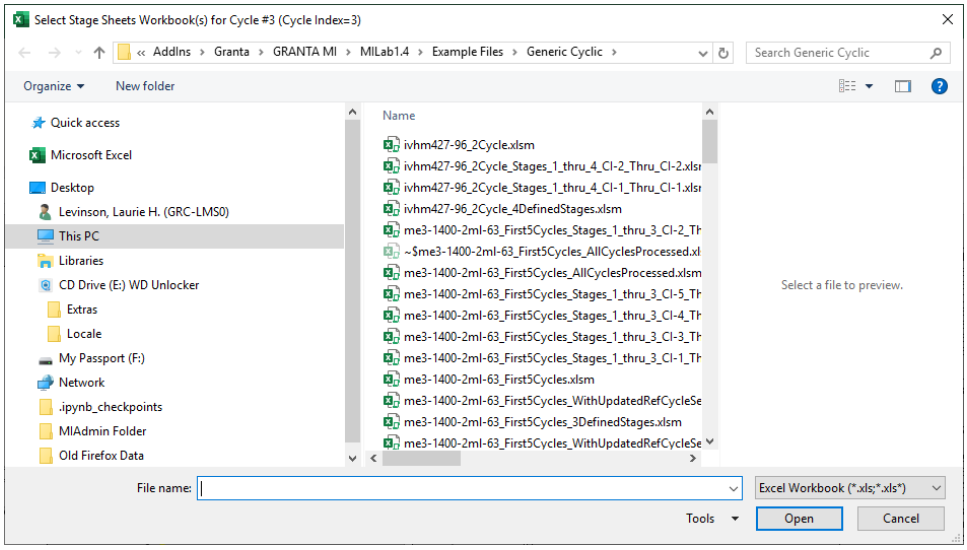


Figure 46.—File browser dialog.

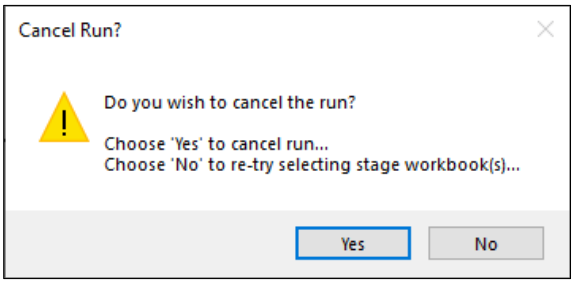


Figure 47.—Cancel Run? confirmation dialog.

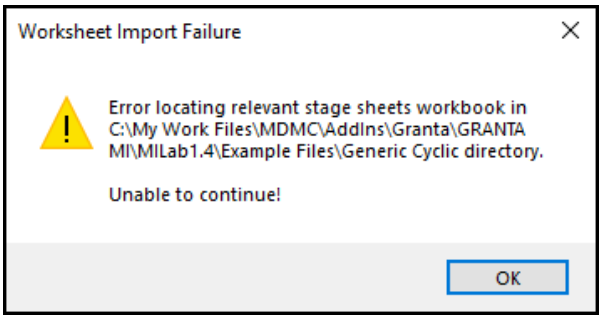


Figure 48.—Worksheet Import Failure dialog.

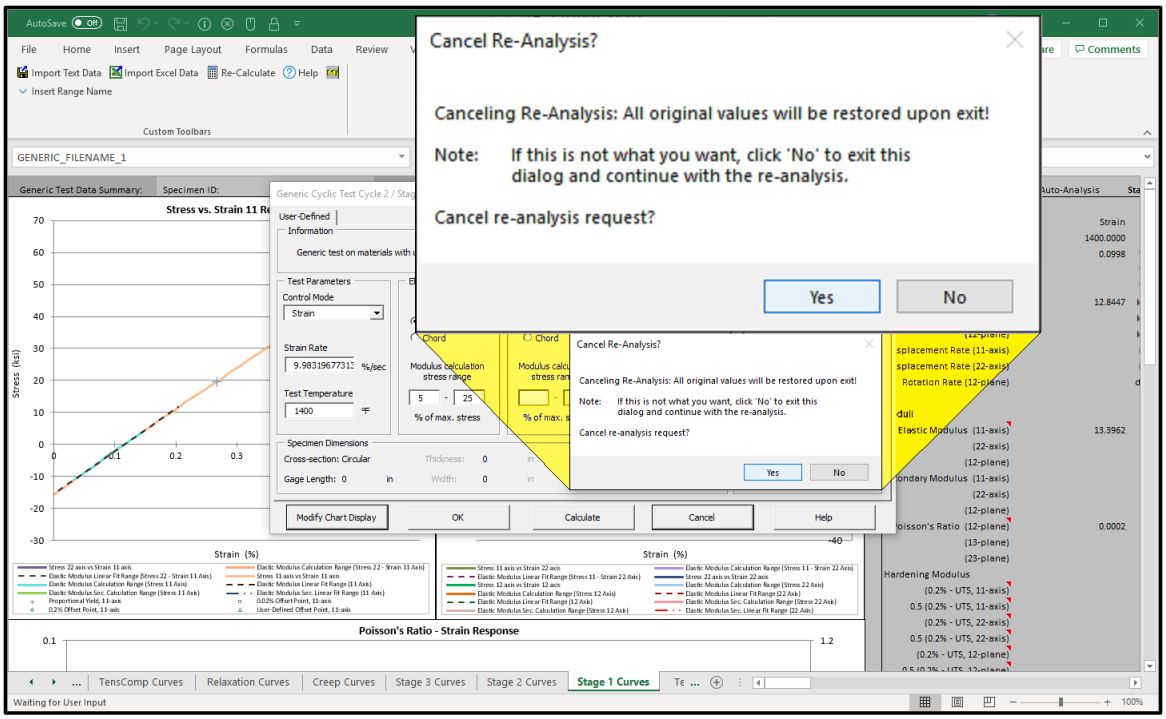


Figure 49.—Cancel Re-Analysis? Dialog displayed following user-requested cancellation of reanalysis process.

4.7 Supplementary Generic-Cyclic-Related Features

4.7.1 Control Curves Worksheet

4.7.1.1 Display Reference Cycle Stage End Point Target Values for Current Cycle

This command button, shown below in Figure 50(a), may be used to display and/or update target parameter settings for the current block that were provided by the user during the manual stage end point specification process for the first cycle in the block (see Section 4.3.2 step 3 for details). The settings are used to enable automated stage end point identification for subsequent cycles in the block and may be displayed by the user via this command button any time after the relevant stage end points and associated target parameter values have been specified. In addition, once the manual stage end point target parameter settings for the block have been provided, but prior to execution of the automated stage end point identification process, this command button may also be used to modify any of the previously specified values.

If the command button is clicked prior to the manual identification of all stage end points and their associated target parameter values for the first cycle of the block, the Target Values Undefined informational message will be displayed, notifying the user that the reference cycle stage end point initialization process must first be completed before the command button may be used to display the associated target parameter values (Figure 51).

If the command button is clicked after the manual stage end point and target parameter specification process has been completed, but prior to execution of the automated stage end point identification process, the dialog shown in Figure 52 will be displayed. The user may then use the Cycle Stage dropdown box to select each stage, as desired, to view and/or update the associated settings. The operation of the dialog is identical to that described for the similar dialog used during the initial stage end point and target parameter specification process, as discussed in Section 4.3.2 step 3, but with one notable exception. In this case, if the values for a selected stage are modified, the user must first click the dialog's Update Reference Cycle Settings command button to save the settings prior to selecting a different stage or exiting the dialog via the

Done command button. If this is not done, the updated settings will be lost and all settings will revert to their prior values. To prevent this from occurring, an attempt to either select a different stage or exit the dialog prior to saving modified settings will trigger a warning message, as shown in Figure 53 asking the user whether they would first like to save their update(s) before continuing. To preserve the modified values before proceeding, click Yes; to cancel the update and restore the prior settings, select No.

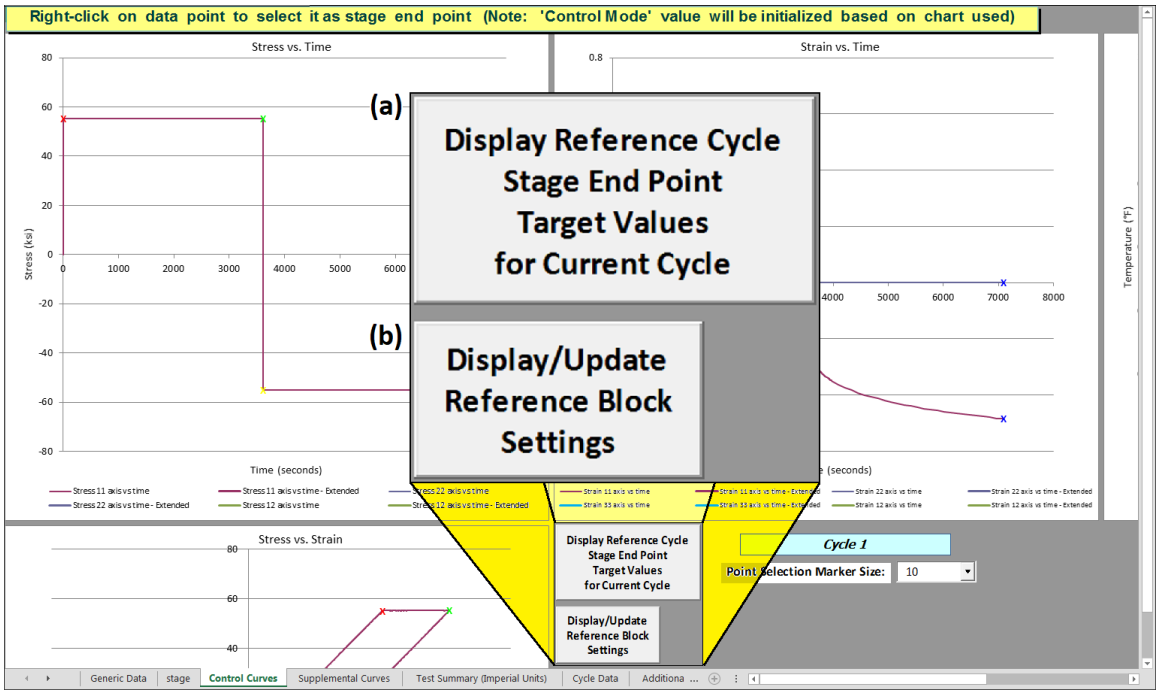


Figure 50.—Control Curves worksheet command buttons that implement supplemental Generic Cyclic test run features.

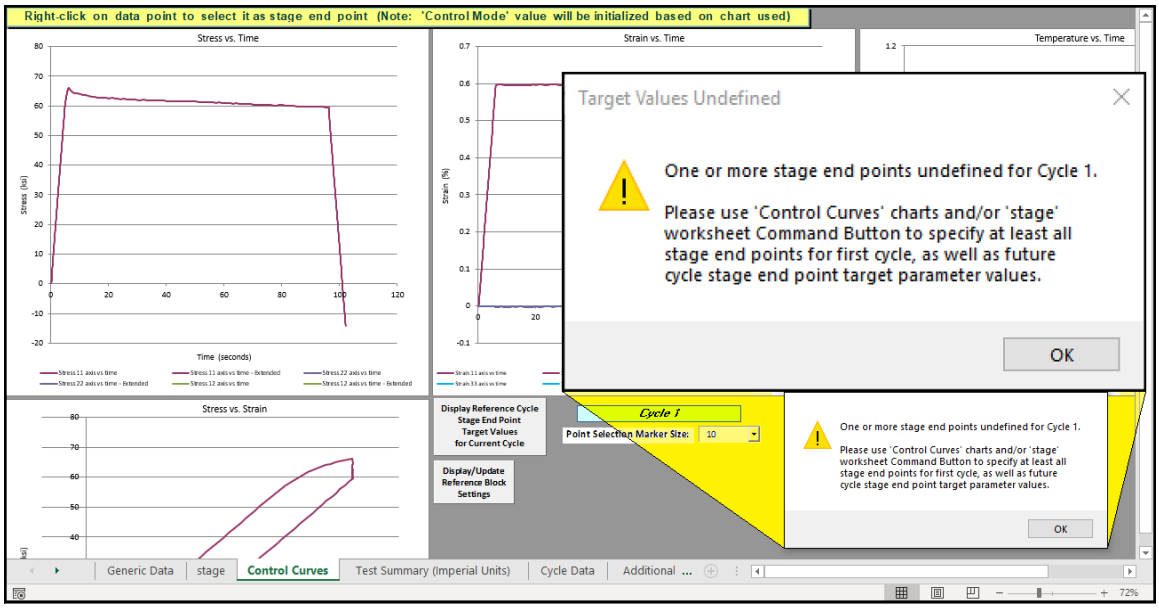


Figure 51.—Target Values Undefined informational message displayed when user clicks Control Curves worksheet's Display Reference Cycle Stage End Point Target Values for Current Cycle command button prior to completing reference cycle stage end point initialization process.

If the command button is clicked after completing the automated stage end point identification process, the dialog shown in Figure 52 will be displayed, enabling the user to view the user-specified settings for each stage by selecting the appropriate stage from the Cycle Stage dropdown box. However, no modification of any settings will be possible, that is, all values will be read-only since all stage end points were already identified.

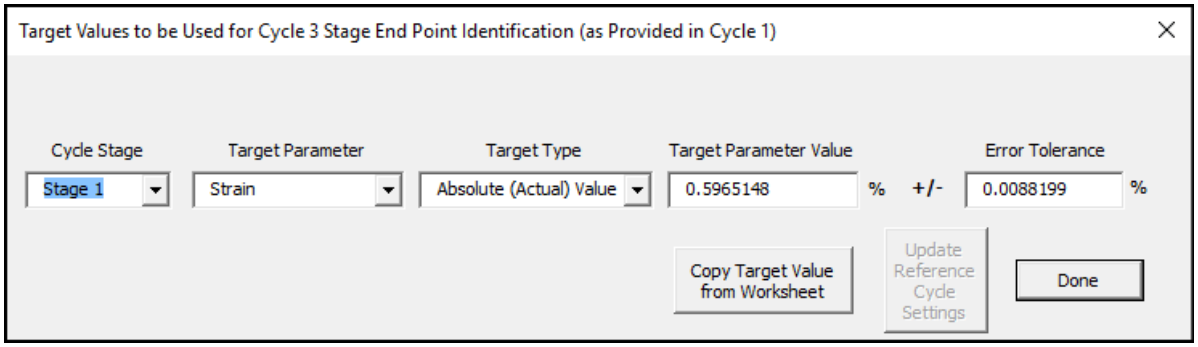


Figure 52.—Dialog displayed via the Control Curves worksheet's Display Reference Cycle Stage End Point Target Values for Current Cycle command button.

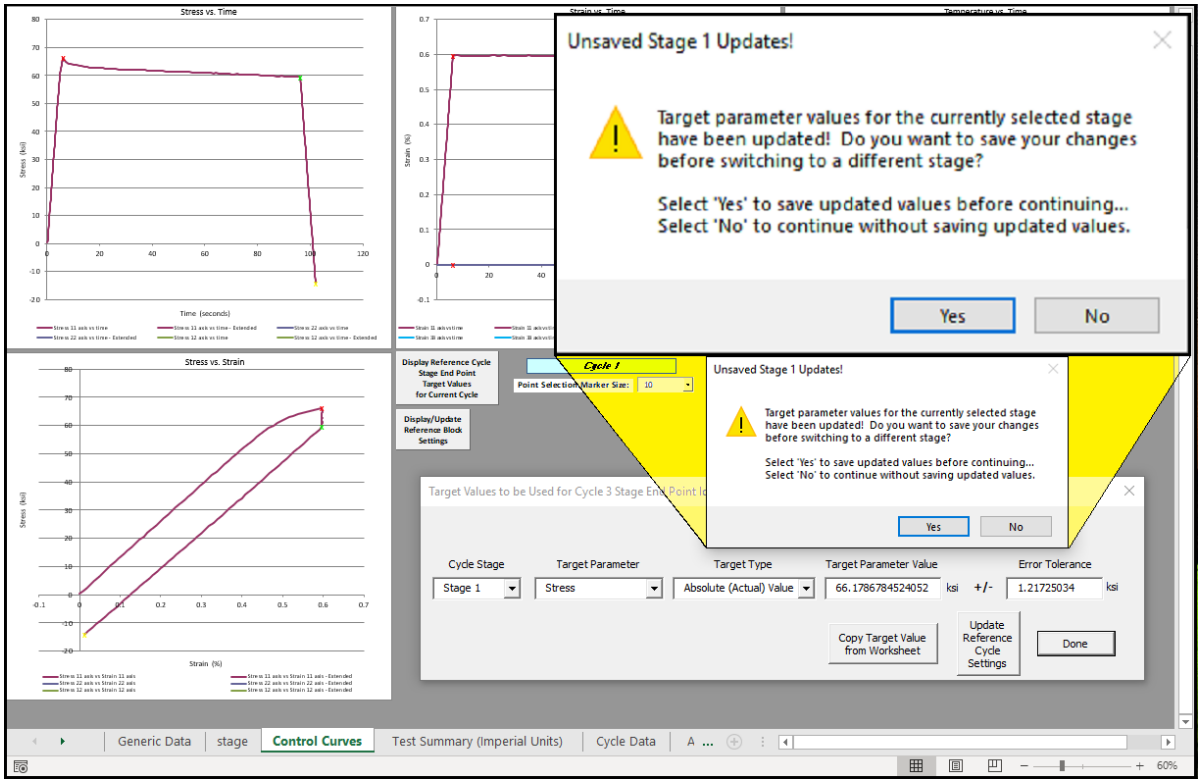


Figure 53.—Message warning of unsaved target parameter modifications.

4.7.1.2 Display and/or Update Reference Block Settings

As discussed in Section 4.2, for Generic Cyclic test runs, the initialization process that immediately follows the data import process includes the identification of a reference cycle for each distinct block of cycles being imported. The reference cycle, as the name implies, is used as a template when identifying stage end points for all subsequent cycles in the block. As such, the user must provide additional input for each reference cycle specified, as described in Section 4.3. The additional input is then used to automate the stage end point identification process for all other cycles in the block, enabling the stage end points to be located without any further input from the user. Each reference cycle specified must be the first cycle of a block of cycles that all have the same test profile, that is, the same number of stages per cycle, with the same stages in each cycle either selected, or not selected, for analysis; an identical order of tensile and/or compression loading or unloading, creep, and/or relaxation stages; and use of the same method to determine the length of each corresponding stage in each of the included cycles (i.e., that would result in the same relative stage end point being selected). As shown in Figure 31, the reference cycle for a block is identified by the user via the Cycle Stage Specifications dialog, which is displayed only during the initialization process that occurs immediately following the data import process. However, at any subsequent point in time, the reference cycle settings for a Generic Cyclic test run can be viewed and, if prior to automated cycle stage end point identification, modified by clicking on the Display/Update Reference Block Settings command button on the Control Curves worksheet (Figure 50(b)) or by clicking on the QAT's Display Reference Blocks icon, displayed in Figure 25.

The process used to modify the initially defined reference cycle specifications is as follows:

1. Click on the Display/Update Reference Block Settings command button on the Control Curves worksheet or on the Display Reference Blocks icon on the QAT to display the Reference Block Listing dialog (Figure 54).
2. Once the dialog has displayed, click on the Update Reference Block(s) command button to display the Update Reference Cycle Settings dialog (Figure 55).
3. In the dialog's Reference Cycle dropdown box, select the new reference cycle to be used for the new or updated block to be specified (Figure 56(a)).
4. In the dialog's Block Start dropdown box, select the first cycle in the new or updated block (Figure 56(b)).
5. In the dialog's Block End dropdown box, select the last cycle that is to be included in the block, which is in an entirely contiguous range starting from the cycle selected in the Block Start dropdown box. Following this selection, if the indicated update represents a valid block and reference cycle specification, the Update Settings command button will then change from its previously disabled state to enabled (Figure 56(c)).
6. Click on the Update Settings command button to save your changes.
7. If a separate cycle or group of cycles exists that is not contiguous with the current range of cycles displayed and currently is set to use a different reference cycle than the reference cycle displayed, but which now is to be updated to use the selected reference cycle instead, repeat the previous steps starting from Step 4 to specify the additional cycle or set of cycles to be included in the new block. Alternatively, if a separate block update is to be performed, repeat the previous steps starting from Step 3.
8. Once all reference block settings have been updated as required, click on the Done command button to close the dialog and return to the Reference Block Listing dialog.
9. Click on the Reference Block Listing dialog's OK command button to exit the dialog.

When updating reference block settings, it is important to recognize that the update process described is tied explicitly to the identification of the reference cycle specified for a given cycle. Therefore, if the reference cycle for a cycle has not changed, there is no need to modify its settings based solely on the fact that other cycles included in the same originally specified block are to use a different reference cycle following a planned update. For this reason, if the user attempts to perform such an update, the Update Settings command button on the Update Reference Cycle Settings dialog will not be enabled, and the user will be unable to complete the intended update process. For example, if the original block specification indicated that cycle 1 was the reference cycle for cycles 1 through 5, but the user intended to update the settings such that cycle 1 is now to be the reference cycle for only cycles 1 and 2, if the user selects cycle 1 as the Reference Cycle, cycle 1 as the Block Start value, and cycle 2 as the Block End value, the Update Settings command button will remain disabled, and the user will be unable to perform the intended update. This is because the reference cycle for cycles 1 and 2 has not changed, so there is no need to perform such an update. Instead, the user should select cycle 3 as the Reference Cycle value, cycle 3 as the Block Start value, and then choose the desired Block End value for the new block being defined. This will then automatically implement any required updates for all blocks impacted by the change once the user clicks on the Update Settings command button.

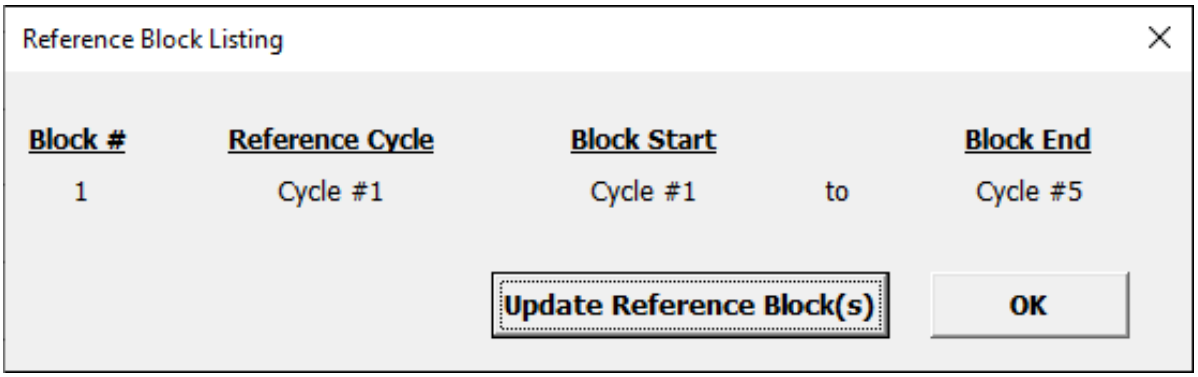


Figure 54.—Reference Block Listing dialog.

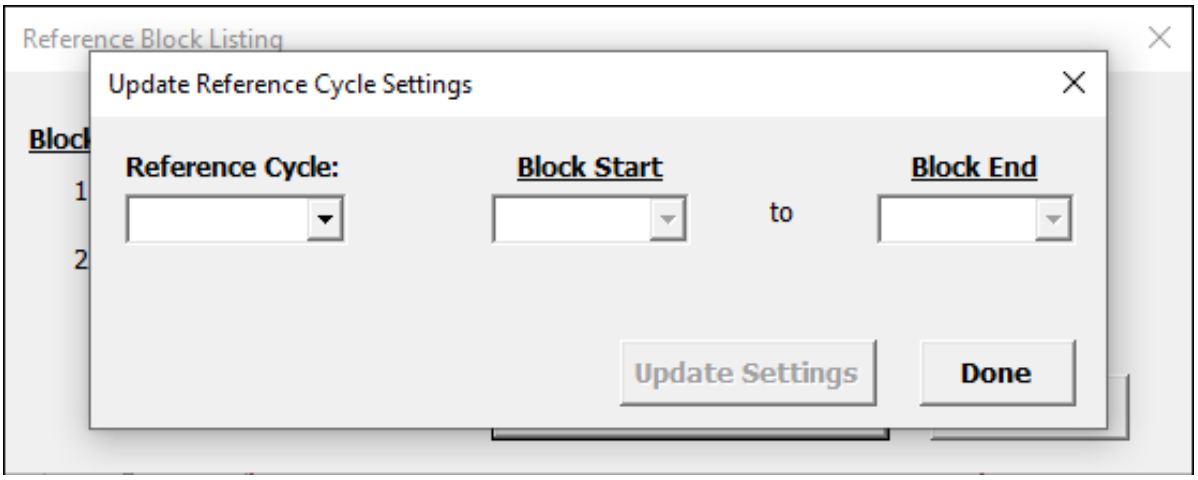


Figure 55.—Update Reference Cycle Settings dialog.

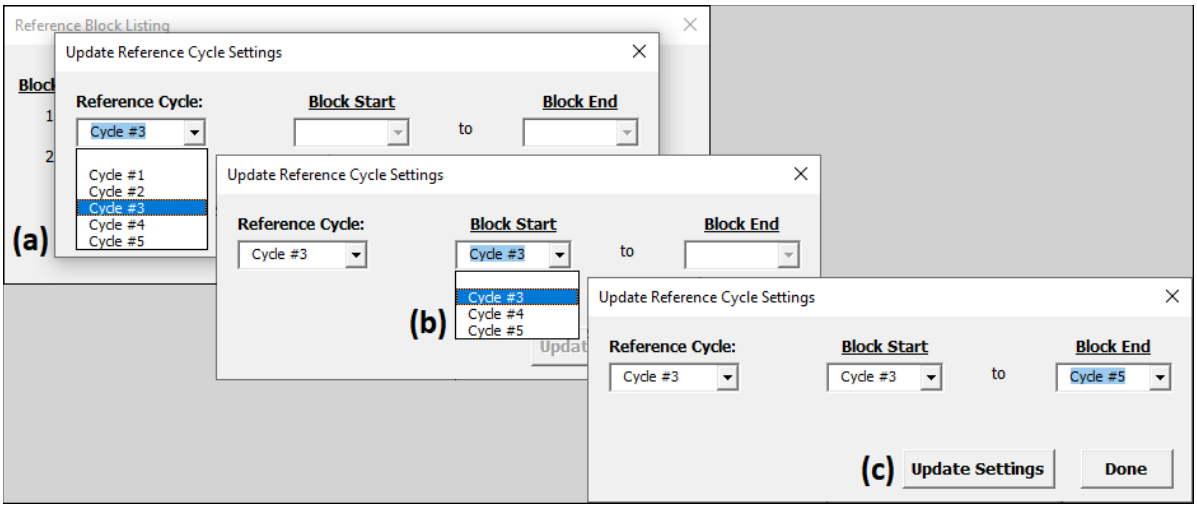


Figure 56.—Reference cycle update process.

4.7.1.3 Point Selection Marker Size

This dropdown box (Figure 17) is provided on both the Control Curves and Supplemental Curves worksheets to enable the user to modify the size of the stage end point markers displayed on the corresponding worksheet's charts.

4.7.2 Test Summary (Imperial Units) and/or Test Summary (Metric Units) Worksheet

4.7.2.1 Create Stage-Based Test Summary Attributes

The Create Stage-Based Test Summary Attributes command button, Figure 57(a), is used to initiate execution of a postprocessing utility that will add individual stage-type-based worksheets (i.e., the TC Summary Data, Creep Summary Data, and/or Relaxation Summary Data worksheets) to the workbook, with each worksheet displaying tables and plots of attribute values for those attributes relevant to the stage type. For each attribute, values will be output by individual stage number, in tabular form and as a plot series, showing the evolution of the value in that stage across all cycles in the test. See Figure 58 for an example of the resulting output.

4.7.2.2 Refresh Plot Data Display

Due to the method used by Excel to display plot data, plots displayed on the Test Summary (Imperial Units) or Test Summary (Metric Units) worksheet may, in certain cases, not display as specified by the plot properties, that is, as a scatter plot with straight lines and markers. Should this occur, clicking on the Refresh Plot Data Display command button, Figure 57(b), will refresh the output so that all plots on the worksheet are properly displayed.

4.7.2.3 Use Linear or Use Logarithmic X-Axis for Cycle-Based Plots

For all TC Summary Data, Creep Summary Data, and Relaxation Summary Data worksheet plots and any Test Summary (Imperial Units) or Test Summary (Metric Units) plots whose x-axis is cycle number based, this command button (Figure 57 (c)) enables the user to toggle the display between using a linear or logarithmic scale for the x-axis.

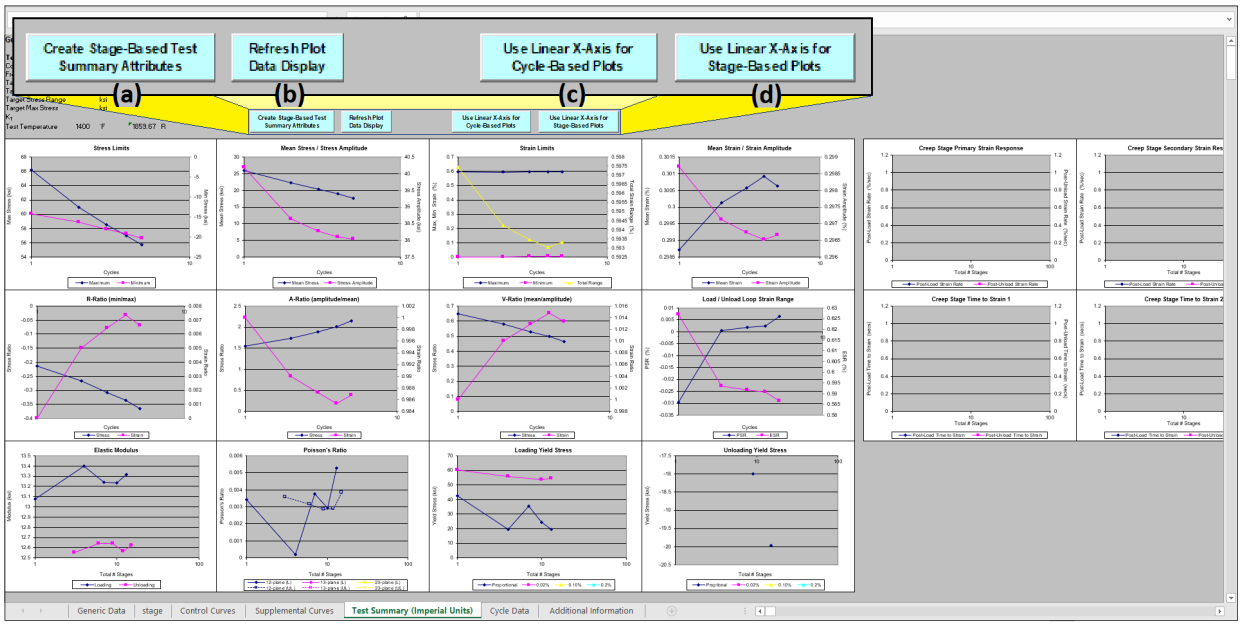


Figure 57.—Test Summary (Imperial Units) and Test Summary (Metric Units) worksheets command buttons.

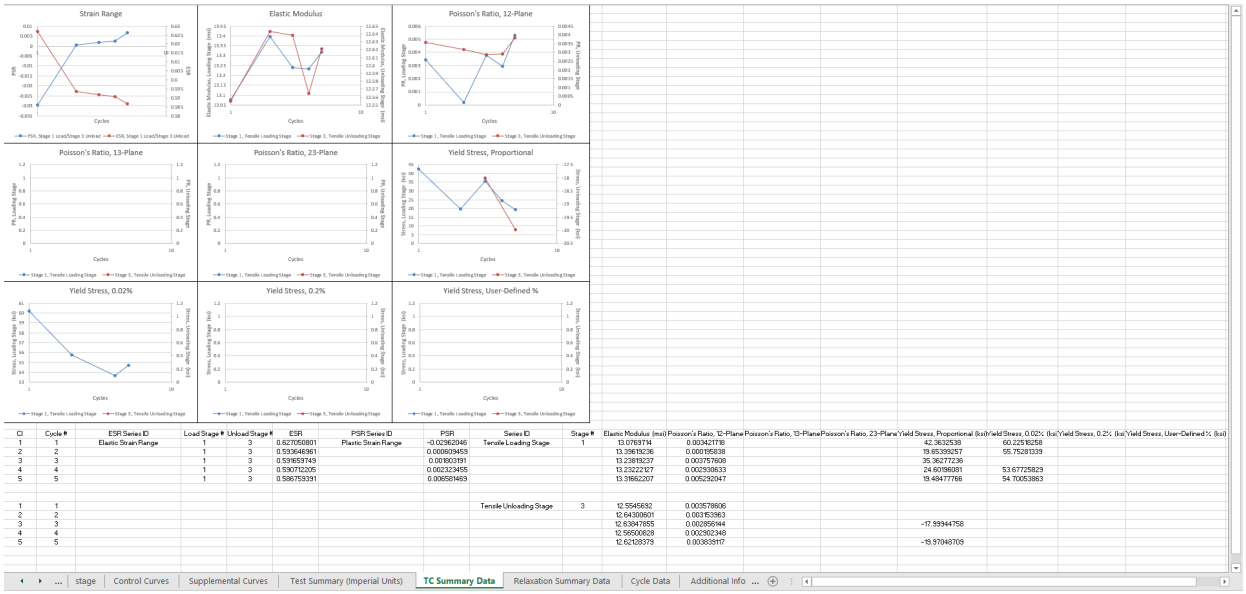


Figure 58.—TC Summary Data worksheet, example of stage-based test summary attributes output.

4.7.2.4 Use Linear or Use Logarithmic X-Axis for Stage-Based Plots

For all plots on the Test Summary (Imperial Units) or Test Summary (Metric Units) worksheets whose x-axis is stage number based, this command button (Figure 57 (d)) enables the user to toggle the x-axis between using a linear or logarithmic scale.

5.0 Saving and Uploading Processed Data

5.1 Saving Analysis Results and Closing File Postanalysis

As discussed previously, during a Generic Cyclic test run, following the analysis of each cycle's data, the detailed analysis results specific to that cycle are saved to a separate Excel file, named using the cycle index of the analyzed cycle and the included cycle stages, with the saved file then closed before proceeding to analyze data from the next cycle. Similarly, for a Generic test, as well as during the analysis of each cycle's data of a Generic Cyclic test, if the number of test stages being analyzed exceeds the number of stages that can be guaranteed to be processed without the risk of exceeding Excel's memory limitations, or whenever the memory limitation is approached, the analysis results from test stages already analyzed will be saved to a separate file with the name based upon the included analyzed stages and the saved file closed before proceeding to analyze data from any subsequent stages. For a Generic Cyclic test, after completing the analysis of data from all test cycles, a message dialog will appear asking the user if they would like to save the file containing the summary analysis results from all analyzed cycles, that is, the updated master file (Figure 42). The user may choose to save the file in response to the prompt or may choose to cancel the dialog and save the file at any subsequent point in time prior to closing the file. However, unless the user explicitly saves the file after completing the analysis, summary analysis results documented in the Generic Cyclic master file will not be preserved. Similarly, following completion of the analysis of data from a Generic test, the user must explicitly save the file prior to closing it in order to preserve the analyzed stage data contained in the file. However, in either case, subsequent to completing the analysis of data from either a Generic or Generic Cyclic test, it should be noted that even after explicitly saving analyzed data contained in the file, when the user then attempts to close the file, Excel will prompt the user asking whether to save the file before it is closed. This is a result of the file being a template-based file with embedded logic that executes whenever the file is accessed, making it appear to Excel as if it has been changed even when there have been no changes. Therefore, whenever a user attempts to close any file containing analyzed Generic or Generic Cyclic test data, regardless of whether or not the existing file's contents have actually been updated by the user since it was last saved, Excel will prompt the user asking whether to save the file before closing it. Provided the user has previously explicitly saved the analyzed data upon completion of the test run, selecting the Don't Save option in response to the Excel prompt will not result in the loss of any analysis data.

5.2 Additional Information Worksheet Copy Function

Each output file will include an Additional Information worksheet, with data format and layout as indicated in Appendix B. The Additional Information worksheet displays selected data entered either manually by the user or derived from imported data and/or user input provided during the data import and/or analysis process and copied automatically to the worksheet. To add data or modify existing values, the user may either enter each value manually, directly on the output file's Additional Information worksheet, or optionally, use the Copy button provided at the top of the worksheet to copy any missing information from a previously completed Additional Information worksheet in a different workbook. To use this feature, both the workbook to be updated and the source data workbook must be open within Excel. The user will then be able to use the dropdown box to the left of the Copy button to select the relevant source data workbook, before clicking the Copy button to perform the update. Note that, when using the Copy button, no test-specific values from the Test Information section of the source worksheet will be copied, nor any values from the Measurement section, other than the various Measurement Method values, since those values reflect individual test results from a particular test, and so are unlikely

to be the same from one workbook to another. In addition, when copying data from the source workbook, only those cells in the destination workbook that are blank will be updated. No existing data will be overwritten when using this feature.

5.3 Output File Specifications

As referenced previously, at predetermined points in the processing of data from both Generic and Generic Cyclic test runs, a check will be made and, if appropriate, detailed analysis results automatically saved to a separate file, with the corresponding detailed analysis worksheets and data removed from the primary file. This is being done to circumvent Excel memory usage limitations, enabling the associated memory to be recovered, and ensuring that Excel does not run out of memory prior to completing the analysis process. Any additional files saved in this manner will have file names based on the name of the primary ("master") output file, but with an additional suffix identifying the specific cycle(s) and/or stages included in the workbook. The primary output file, as well as all associated cycle- or stage-specific files will, by default, be saved to the directory where the raw test data input file is located. For Excel Import test runs, the primary file will have a file name of the form:

[raw_source_data_file_name]-[source_data_worksheet_name].xlsm

For Text Import test runs, the primary output data file will have a file name of the form:

[raw_source_data_file_name].xlsm

During the initial analysis, but not during the reanalysis, once the analysis of each stage other than the final stage has been completed, a check will be made to determine the current Excel memory usage state and the number of stages that have been processed since data was last saved to a stage- or cycle-specific file. If either five stages have been processed since the last time data was saved or Excel's memory usage has exceeded 850 Mb, the detailed analysis results will be saved to a separate output file and the corresponding data and worksheets removed from the primary file. For Generic test runs, each such file will be given a file name of the form:

[primary_processed_file_name]_Stages_[first_stage_not_yet_saved]_thru_[last_stage_processed].xlsm

For Generic Cyclic test runs, any cycle- or stage-specific files containing the detailed analysis results will be given a file name of the form:

[primary_processed_file_name]_Stages_[first_stage_not_yet_saved]_thru_[last_stage_processed]_CI-[first_cycle_not_yet_saved]_Thru_CI-[last_cycle_processed].xlsm

For Generic Cyclic test runs, the add-in is currently configured such that, at the end of each cycle, all detailed analysis results and associated worksheets will be saved to a separate file and removed from the primary file. For this reason, as currently configured, the [first_cycle_not_yet_saved] and [last_cycle_processed] values included in the file name will always be identical since the detailed analysis results from, at most, only one entire cycle will be included in each such file.

Note that, given the previously described process of exporting detailed analysis results from both Generic and Generic Cyclic test runs to separate files, as required to circumvent Excel's memory usage

limitations, processed data output during the analysis of data from a single raw source data file will often reside in multiple related Excel files. Therefore, if the user subsequently attempts to perform the reanalysis of this data, worksheets required during the reanalysis process may, and for Generic Cyclic test data, will, reside in more than one workbook. Consequently, caution should be used when moving processed data files from the directory to which they were originally output during the analysis process to a different directory, taking care to move all related files together as a group, if such a move is required. This will minimize the risk of a problem occurring during any subsequent reanalysis process. See the appropriate section for detailed information on the topic. For Generic test runs, the reanalysis should be performed according to instructions contained in Section 3.6, utilizing the workbook containing detailed analysis results from the specific stage of interest to initiate the reanalysis process. For Generic Cyclic test runs, instructions for the reanalysis of previously analyzed data are provided in Section 4.6. As described in that section, the primary (master) file should be used to initiate any such reanalysis. The required detailed analysis worksheets and associated data will then be accessed from the file(s) where those worksheets reside, with the worksheets imported into the master file and reexported back to the detailed analysis workbook(s) in an automated fashion prior to, and after, performing the reanalysis, respectively. Performing the reanalysis in this manner will ensure that all data is properly updated and that the primary and cycle- and stage-specific files remain synchronized.

5.4 Uploading Data to Materials Intelligence Database

Uploading processed data to the MI database is accomplished via the Granta-supplied MI:Toolbox application, installed on the user's computer as part of the Granta software suite. Upon program activation, a dialog will immediately be displayed requesting the user enter the address to be used to connect to the MI database server. The first time this dialog is displayed, the user will need to provide the server name, granta.ndc.nasa.gov, or, alternatively, the server address, currently gr3088svfil57.ndc.nasa.gov, ensuring also that the "Use System Authentication" check box is checked (see Figure 59). Following this initial login, the prior settings will be restored each time MI:Toolbox is activated.

After completing the MI:Toolbox login, processed test data may be uploaded to the Test Data: Generic database table using the following procedure:

1. Click on the Current Database dropdown arrow at the top right of the display, and select the NASA GRC database (see Figure 60).
2. Click on the Import Toolbar button in the top left-hand corner (Figure 61(a)) to display the Select a "Plug-In" Module dialog box (Figure 61(b)).
3. Select the Excel Importer plug-in option, and click Open (Figure 61(c)) to display the Excel Importer GUI (see Figure 62).
4. In the upper portion of the Excel Importer interface, on the right-hand side, click on the Browse button (Figure 63(a)), and navigate to the directory where the files to be uploaded are located. Select the relevant files, and then click the Open button. At this point, the file selection dialog will close, and the list of selected files will appear in the text box at the top of the GUI (Figure 63(b)).
5. Click on the blue arrow in the bottom right-hand corner of the MI:Toolbox GUI (Figure 63(c)), and the data upload will then begin.

As an alternative to this procedure, it is also possible to upload data via the Granta MI:Toolbox Excel Importer command line interface. This option enables the user to create a batch file containing the appropriate commands, which can then be executed either manually, or installed as a scheduled task on the

user's machine, performing the upload on a predetermined basis. See Excel Importer CLI, Appendix B of the GRANTA MI Excel Importer Reference Guide document (Ref. 5) for additional details.

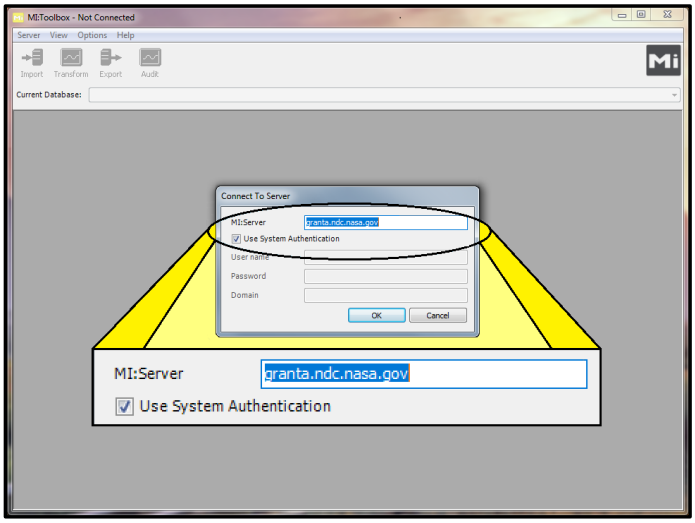


Figure 59.—MI:Toolbox login screen.

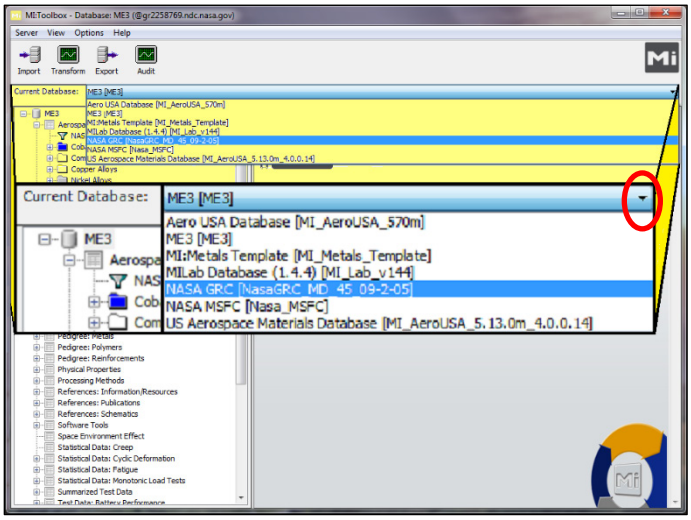


Figure 60.—Database selection within MI:Toolbox.

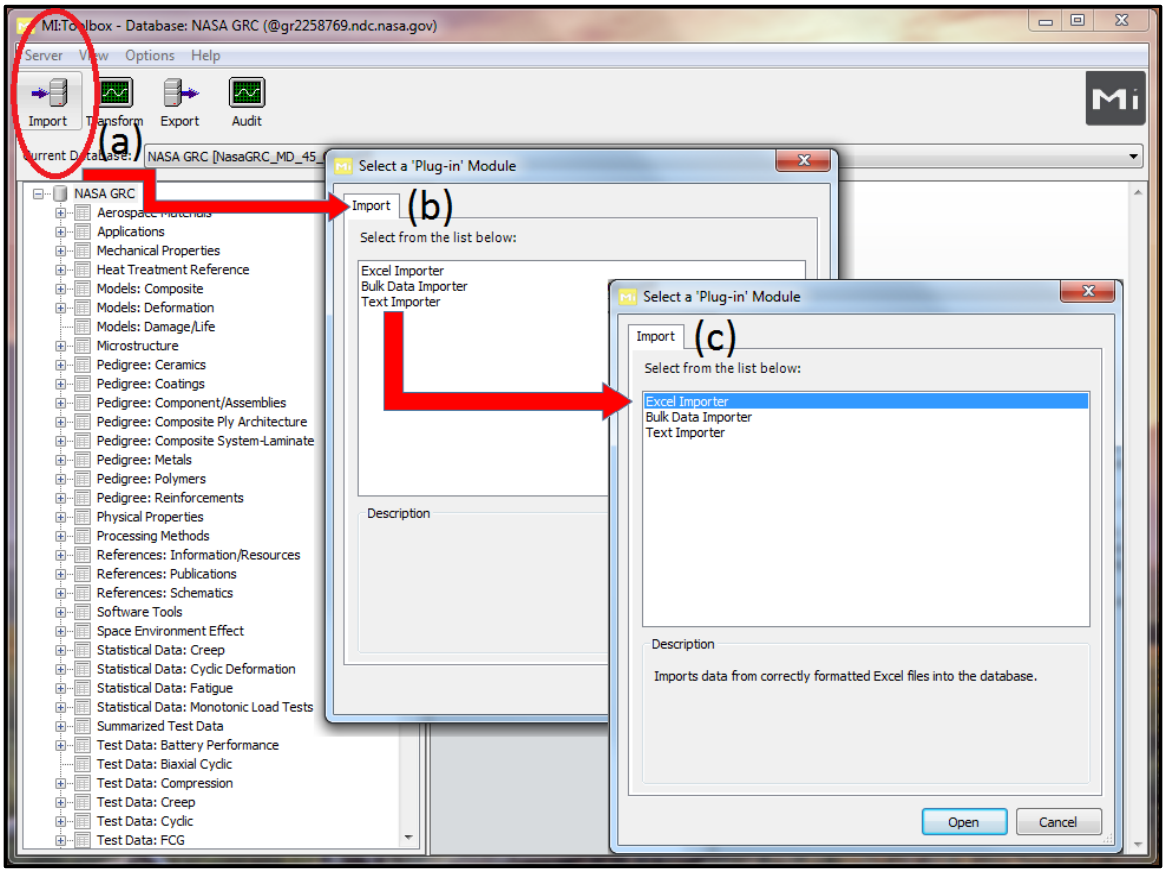


Figure 61.—MI:Toolbox Excel Importer selection process.

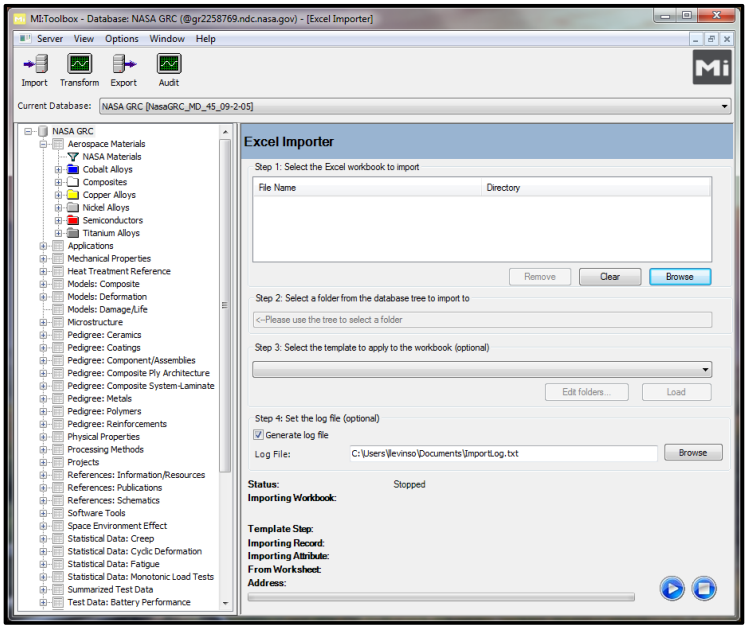


Figure 62.—MI:Toolbox Excel Importer graphical user interface.

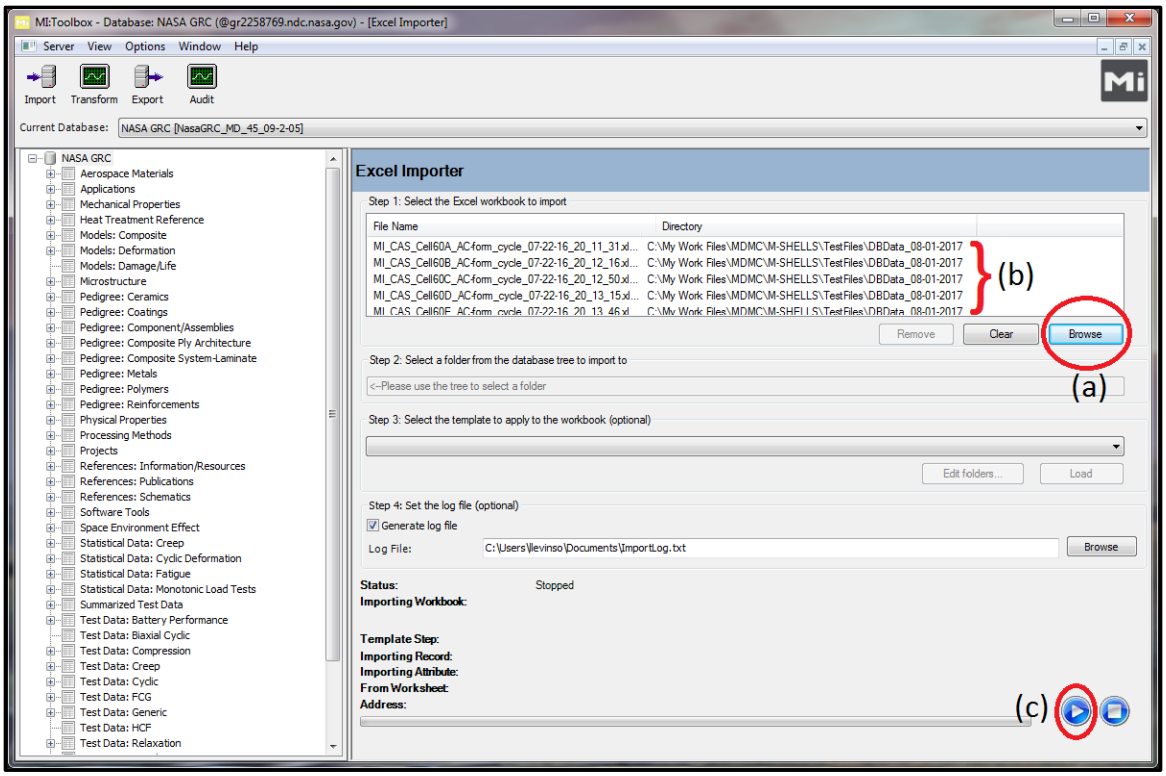


Figure 63.—File selection and data upload initiation via MI:Toolbox Excel Importer.

5.5 Viewing Uploaded Data

Once the user's data has been uploaded to the database, the data may be viewed by opening the web browser of the user's choice and navigating to the GRANTA MI database via the URL, https://granta.ndc.nasa.gov/mi. This will bring up the GRC database master homepage (Figure 64), from which the user may then click on one of the provided icons, either the NASA GRC Database icon or one of the five icons representing the five tabs of the GRC database graphical interface (Materials, Models, Software Tools, Applications, or References) to access the database. For Generic and Generic Cyclic data, clicking on either the NASA GRC Database or Materials icon will display the tab providing graphical access to the Test Data: Generic database table containing all uploaded Generic and Generic Cyclic test data (see Figure 65).

Once the Materials tab of the GUI is displayed in the right-hand frame of the page, left-clicking on the Generic pick of the Test Data graphic (Figure 66) will expand the Test Data: Generic table node. Alternatively, left-clicking on the Test Data: Generic table name, or the corresponding folder icon immediately to the left of the table name in the left-hand frame (the tree), will expand the tree node, displaying the name of the currently selected data subset, as well as the set of folders specified at the highest level of the table's folder hierarchy. If more than one subset has been specified, enabling differing data layouts to be utilized under different circumstances, the selected subset may be updated by left-clicking on the dropdown arrow next to the name of the current subset and selecting the desired subset (the Test Data: Generic table's default subset is currently the Multiple Loading subset). Once the appropriate subset has been selected, left-clicking on the arrow displayed immediately to the left of the relevant folder name at each level of the tree hierarchy, or clicking on the relevant folder name, will expand the corresponding node, enabling the user to view the list of folders and/or records contained within the selected folder. Once the required folder has been expanded, left-clicking on the record icon to the left of the record name, or clicking on the record name itself, will display the selected record's data.

An additional set of menu options will then appear at the top right of the web browser window frame displaying the data, immediately above the record header identifying the record. These additional menu options may be used to modify the display according to the user's preferences, or to perform other associated tasks, such as exporting record data to a file.

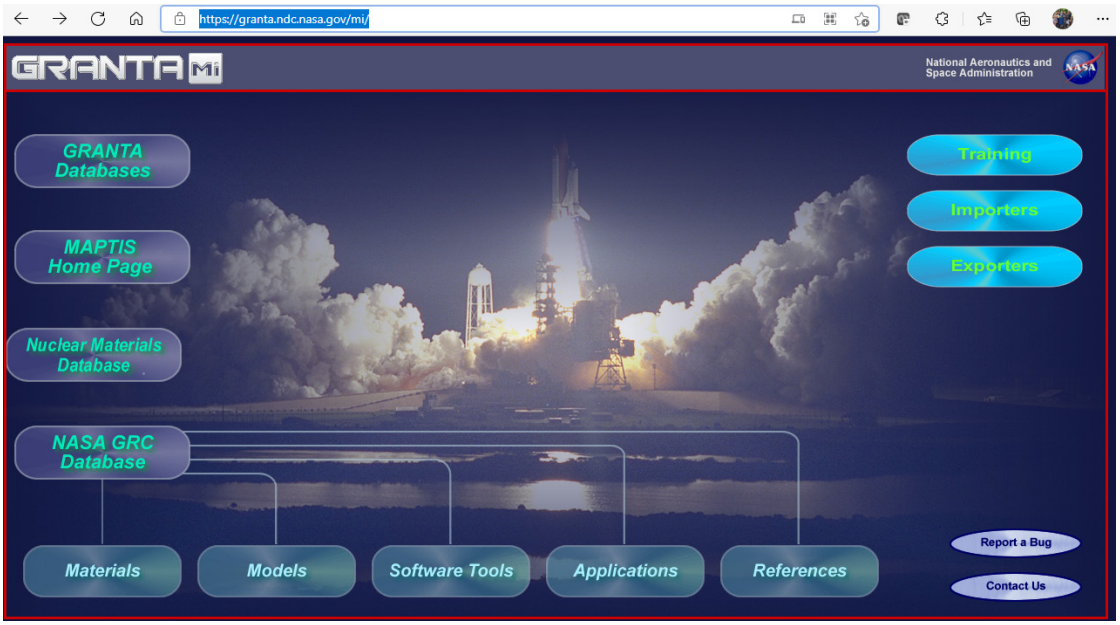


Figure 64.—GRC Database master homepage.

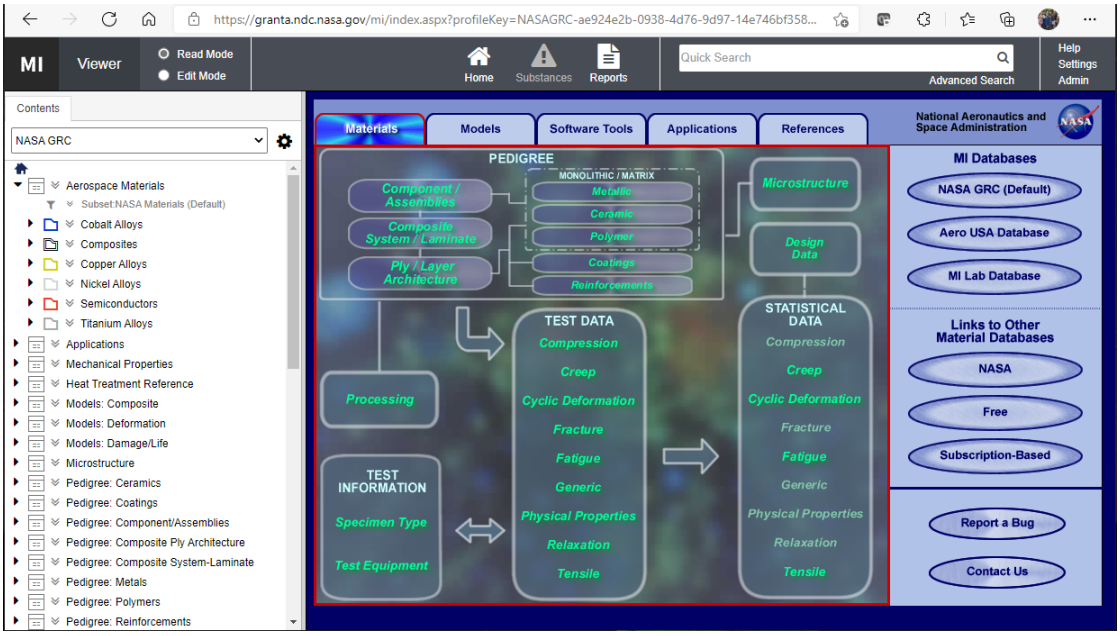


Figure 65.—GRC Database graphical user interface, with Materials tab selected.

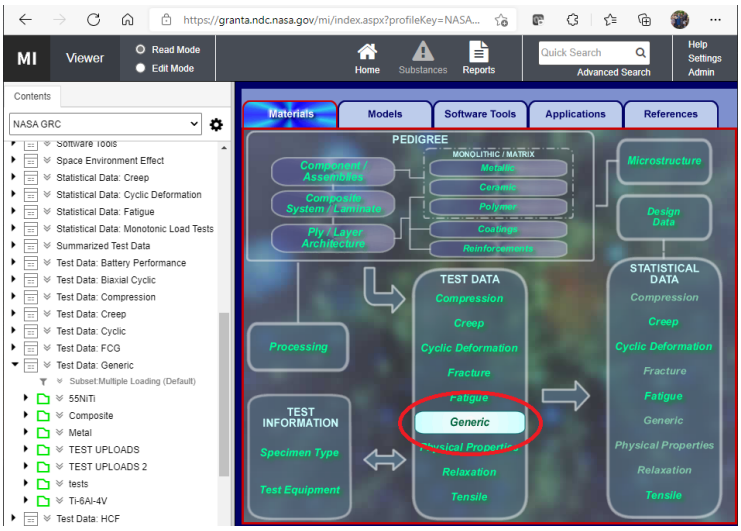


Figure 66.—MI Database Generic Table selection.

Note that attribute names for data displayed in the database, in some cases, will differ somewhat from the names used to identify corresponding data in the processed Excel file from which the data was uploaded. The mapping of database attribute names to the location of the corresponding data in the Excel source data file, however, is provided in tables included in Appendix A of this guide.

Appendix A.—Worksheet Attribute and Parameter Specifications

Table A.1 to Table A.16 in this appendix provide detailed specifications for all attributes and parameters that may be output to the template-based Microsoft Excel file(s) during processing of data from Generic or Generic Cyclic test runs and subsequently uploaded to the Materials Intelligence (MI) database. For any given test run, only those attributes and parameters relevant to the specific test for which data have been imported and analyzed will in fact be output to the Excel file (for example, if no creep stages are included in the test, then no creep attributes or parameters will be included in the Excel file; or, if it is a Generic test, no Generic Cyclic attributes or parameters will be included).

Among the tables provided in this section, those identified as containing test summary attributes or parameters provide the specifications for attributes or parameters that are not associated with an individual test stage. For Generic test runs, this includes data imported from the raw source data file, values output by the software during the stage definition process, input provided by the user during either the data import or stage definition process (that is, input provided prior to performing the analysis), or input provided by the user by entering it on the Additional Information worksheet. The latter includes utilizing the Additional Information Worksheet Copy Function, as described in Section 5.2 of this document. For Generic Cyclic test runs, in addition to the categories of data listed as included in Generic test summary attributes and parameters, Generic Cyclic test summary attributes and parameters include data showing the evolution of key values across all cycles in the test and values defined in relation to the test as a whole (for example, Half-life Cycle, Maximum Stress at Half-life, etc.).

The remaining tables included in this section fall into one of two categories: tables that provide the specifications for attributes or parameters output during the analysis and associated with a particular stage type, that is, data output during the analysis of a tensile or compression, creep, or relaxation stage; and tables that provide the specifications for attributes or parameters associated with data output via the Generic Cyclic postprocessing utility, as described in Section 4.7.2.1, that is, data output by individual stage number showing the evolution of the value in that stage across all cycles in the test (see Figure 58 for an example).

Note that, from the standpoint of the GRC MILab software, each individual cycle in a Generic Cyclic test is the equivalent of a Generic test. Thus, for purposes of the information provided in this appendix, for each individual cycle, Generic Cyclic attributes and parameters relevant to the entire cycle are those attributes and parameters provided in the tables identified as containing Generic test summary attributes and parameters.

For general information about database attributes and parameters and their function with respect to the MI database, as well as a detailed description of all database data types, see Reference 5.

TABLE A.1.—GENERIC TEST SUMMARY ATTRIBUTE SPECIFICATIONS

Database attribute name	Database data type[a]	Default units	Source data worksheet	Source data worksheet, data range name	Source data worksheet, parameter range name(s)
Record Name	RCN		Generic Data	MI_RECORDNAME	
Test ID	STXT		Generic Data	MI_RECORDNAME	
Stress (11 axis) vs time	FDA	ksi	Generic Data	MI_STRESS11_COL	MI_TIME_COL
Stress (22 axis) vs time	FDA	ksi	Generic Data	MI_STRESS22_COL	MI_TIME_COL
Shear stress (12 axis) vs time	FDA	ksi	Generic Data	MI_SHEAR_STRESS_COL	MI_TIME_COL
Load (11 axis) vs time	FDA	lbf	Generic Data	MI_LOAD11_COL	MI_TIME_COL
Load (22 axis) vs time	FDA	lbf	Generic Data	MI_LOAD22_COL	MI_TIME_COL
Shear load (12 axis) vs time	FDA	lbf	Generic Data	MI_SHEAR_LOAD_COL	MI_TIME_COL
Strain (11 axis) vs time	FDA	%	Generic Data	MI_STRAIN11_COL	MI_TIME_COL
Strain (22 axis) vs time	FDA	%	Generic Data	MI_STRAIN22_COL	MI_TIME_COL
Strain (33 axis) vs time	FDA	%	Generic Data	MI_STRAIN33_COL	MI_TIME_COL
Shear strain (12 axis) vs time	FDA	%	Generic Data	MI_SHEAR_STRAIN_COL	MI_TIME_COL
Displacement (11 axis) vs time	FDA	in	Generic Data	MI_DISPLACEMENT11_COL	MI_TIME_COL
Displacement (22 axis) vs time	FDA	in	Generic Data	MI_DISPLACEMENT22_COL	MI_TIME_COL
Rotation vs time	FDA	°	Generic Data	MI_ROTATION_COL	MI_TIME_COL
Test Temperature vs time	FDA	°F	Generic Data	MI_TEMP_COL	MI_TIME_COL
Stress (11 axis) vs Strain (11 axis)	FDA	ksi	Generic Data	MI_STRESS11_COL	MI_STRAIN11_COL
Stress (11 axis) vs Strain (22 axis)	FDA	ksi	Generic Data	MI_STRESS11_COL	MI_STRAIN22_COL
Stress (11 axis) vs Strain (33 axis)	FDA	ksi	Generic Data	MI_STRESS11_COL	MI_STRAIN33_COL
Stress (11 axis) vs shear strain (12 axis)	FDA	ksi	Generic Data	MI_STRESS11_COL	MI_SHEAR_STRAIN_COL
Stress (22 axis) vs Strain (11 axis)	FDA	ksi	Generic Data	MI_STRESS22_COL	MI_STRAIN11_COL
Stress (22 axis) vs Strain (22 axis)	FDA	ksi	Generic Data	MI_STRESS22_COL	MI_STRAIN22_COL
Stress (22 axis) vs Strain (33 axis)	FDA	ksi	Generic Data	MI_STRESS22_COL	MI_STRAIN33_COL
Stress (22 axis) vs shear strain (12 axis)	FDA	ksi	Generic Data	MI_STRESS22_COL	MI_SHEAR_STRAIN_COL
Shear stress (12 axis) vs Strain (11 axis)	FDA	ksi	Generic Data	MI_SHEAR_STRESS_COL	MI_STRAIN11_COL
Shear stress (12 axis) vs Strain (22 axis)	FDA	ksi	Generic Data	MI_SHEAR_STRESS_COL	MI_STRAIN22_COL
Shear stress (12 axis) vs Strain (33 axis)	FDA	ksi	Generic Data	MI_SHEAR_STRESS_COL	MI_STRAIN33_COL
Shear stress (12 axis) vs shear strain (12 axis)	FDA	ksi	Generic Data	MI_SHEAR_STRESS_COL	MI_SHEAR_STRAIN_COL
Load (11 axis) vs Strain (11 axis)	FDA	lbf	Generic Data	MI_LOAD11_COL	MI_STRAIN11_COL

TABLE A.1.—GENERIC TEST SUMMARY ATTRIBUTE SPECIFICATIONS

Database attribute name	Database data type[a]	Default units	Source data worksheet	Source data worksheet, data range name	Source data worksheet, parameter range name(s)
Load (11 axis) vs Strain (22 axis)	FDA	lbf	Generic Data	MI_LOAD11_COL	MI_STRAIN22_COL
Load (11 axis) vs Strain (33 axis)	FDA	lbf	Generic Data	MI_LOAD11_COL	MI_STRAIN33_COL
Load (11 axis) vs shear strain (12 axis)	FDA	lbf	Generic Data	MI_LOAD11_COL	MI_SHEAR_STRAIN_COL
Load (22 axis) vs Strain (11 axis)	FDA	lbf	Generic Data	MI_LOAD22_COL	MI_STRAIN11_COL
Load (22 axis) vs Strain (22 axis)	FDA	lbf	Generic Data	MI_LOAD22_COL	MI_STRAIN22_COL
Load (22 axis) vs Strain (33 axis)	FDA	lbf	Generic Data	MI_LOAD22_COL	MI_STRAIN33_COL
Load (22 axis) vs shear strain (12 axis)	FDA	lbf	Generic Data	MI_LOAD22_COL	MI_SHEAR_STRAIN_COL
Shear load (12 axis) vs Strain (11 axis)	FDA	lbf	Generic Data	MI_SHEAR_LOAD_COL	MI_STRAIN11_COL
Shear load (12 axis) vs Strain (22 axis)	FDA	lbf	Generic Data	MI_SHEAR_LOAD_COL	MI_STRAIN22_COL
Shear load (12 axis) vs Strain (33 axis)	FDA	lbf	Generic Data	MI_SHEAR_LOAD_COL	MI_STRAIN33_COL
Shear load (12 axis) vs shear strain (12 axis)	FDA	lbf	Generic Data	MI_SHEAR_LOAD_COL	MI_SHEAR_STRAIN_COL
Stress (11 axis) vs Test Temperature	FDA	ksi	Generic Data	MI_STRESS11_COL	MI_TEMP_COL
Stress (22 axis) vs Test Temperature	FDA	ksi	Generic Data	MI_STRESS22_COL	MI_TEMP_COL
Shear stress (12 axis) vs Test Temperature	FDA	ksi	Generic Data	MI_SHEAR_STRESS_COL	MI_TEMP_COL
Load (11 axis) vs Test Temperature	FDA	lbf	Generic Data	MI_LOAD11_COL	MI_TEMP_COL
Load (22 axis) vs Test Temperature	FDA	lbf	Generic Data	MI_LOAD22_COL	MI_TEMP_COL
Shear load (12 axis) vs Test Temperature	FDA	lbf	Generic Data	MI_SHEAR_LOAD_COL	MI_TEMP_COL
Strain (11 axis) vs Test Temperature	FDA	%	Generic Data	MI_STRAIN11_COL	MI_TEMP_COL
Strain (22 axis) vs Test Temperature	FDA	%	Generic Data	MI_STRAIN22_COL	MI_TEMP_COL
Strain (33 axis) vs Test Temperature	FDA	%	Generic Data	MI_STRAIN33_COL	MI_TEMP_COL
Shear strain (12 axis) vs Test Temperature	FDA	%	Generic Data	MI_SHEAR_STRAIN_COL	MI_TEMP_COL
Control: Strain (11 axis) vs time	FDA	%	Stage	MI_HIST_STRAIN11	MI_HIST_TIME
Control: Strain (22 axis) vs time	FDA	%	Stage	MI_HIST_STRAIN22	MI_HIST_TIME
Control: Strain (33 axis) vs time	FDA	%	Stage	MI_HIST_STRAIN33	MI_HIST_TIME
Control: Shear strain (12 plane) vs time	FDA	%	Stage	MI_HIST_SHEARSTRAIN	MI_HIST_TIME
Control: Load (11 axis) vs time	FDA	lbf	Stage	MI_HIST_LOAD11	MI_HIST_TIME
Control: Load (22 axis) vs time	FDA	lbf	Stage	MI_HIST_LOAD22	MI_HIST_TIME
Control: Shear load (12 plane) vs time	FDA	lbf	Stage	MI_HIST_SHEARLOAD	MI_HIST_TIME
Control: Stress (11 axis) vs time	FDA	ksi	Stage	MI_HIST_STRESS11	MI_HIST_TIME

TABLE A.1.—GENERIC TEST SUMMARY ATTRIBUTE SPECIFICATIONS

Database attribute name	Database data type[a]	Default units	Source data worksheet	Source data worksheet, data range name	Source data worksheet, parameter range name(s)
Control: Stress (22 axis) vs time	FDA	ksi	Stage	MI_HIST_STRESS22	MI_HIST_TIME
Control: Shear stress (12 plane) vs time	FDA	ksi	Stage	MI_HIST_SHEARSTRESS	MI_HIST_TIME
Control: Displacement (11 axis) vs time	FDA	in	Stage	MI_HIST_DISPLACEMENT11	MI_HIST_TIME
Control: Displacement (22 axis) vs time	FDA	in	Stage	MI_HIST_DISPLACEMENT22	MI_HIST_TIME
Control: Rotation vs time	FDA	°	Stage	MI_HIST_ROTATION	MI_HIST_TIME
Control: Test Temperature vs time	FDA	°F	Stage	MI_HIST_TEMP	MI_HIST_TIME
Initial Time	PNT	s	Stage	MI_INITIAL_TIME	
Initial Temperature	PNT	°F	Stage	MI_INITIAL_TEMP	
Initial Strain 11 axis	PNT	%	Stage	MI_INITIAL_STRAIN	
Initial Strain 22 axis	PNT	%	Stage	MI_INITIAL_STRAIN2	
Initial Strain 33 axis	PNT	%	Stage	MI_INITIAL_STRAIN3	
Initial Shear Strain	PNT	%	Stage	MI_INITIAL_SHEARSTRAIN	
Initial Stress 11 axis	PNT	ksi	Stage	MI_INITIAL_STRESS	
Initial Stress 22 axis	PNT	ksi	Stage	MI_INITIAL_STRESS2	
Initial Shear Stress	PNT	ksi	Stage	MI_INITIAL_SHEARSTRESS	
Initial Displacement 11 axis	PNT	in	Stage	MI_INITIAL_DISPLACEMENT	
Initial Displacement 22 axis	PNT	in	Stage	MI_INITIAL_DISPLACEMENT2	
Initial Rotation	PNT	°	Stage	MI_INITIAL_ROTATION	
Initial Load 11 axis	PNT	lbf	Stage	MI_INITIAL_LOAD	
Initial Load 22 axis	PNT	lbf	Stage	MI_INITIAL_LOAD2	
Initial Shear Load (12 axis)	PNT	lbf	Stage	MI_INITIAL_SHEARLOAD	
Test Summary	TABL		Stage	MI_HIST_STAGENUMBER	MI_HIST_STAGENAME
					MI_HIST_STAGETYPE
					MI_HIST_CONTROLMODE
					MI_HIST_TIME
					MI_HIST_STRESSRATE11
					MI_HIST_STRESSRATE22
					MI_HIST_SHEARSTRESSRATE
					MI_HIST_LOADRATE11

TABLE A.1.—GENERIC TEST SUMMARY ATTRIBUTE SPECIFICATIONS

Database attribute name	Database data type[a]	Default units	Source data worksheet	Source data worksheet, data range name	Source data worksheet, parameter range name(s)
					MI_HIST_LOADRATE22
					MI_HIST_SHEARLOADRATE
					MI_HIST_STRAINRATE11
					MI_HIST_STRAINRATE22
					MI_HIST_STRAINRATE33
					MI_HIST_SHEARSTRAINRATE
					MI_HIST_DISPLACEMENTRATE11
					MI_HIST_DISPLACEMENTRATE22
					MI_HIST_ROTATIONRATE
					MI_HIST_TEMPRATE
					MI_HIST_STRESS11
					MI_HIST_STRESS22
					MI_HIST_SHEARSTRESS
					MI_HIST_LOAD11
					MI_HIST_LOAD22
					MI_HIST_SHEARLOAD
					MI_HIST_STRAIN11
					MI_HIST_STRAIN22
					MI_HIST_STRAIN33
					MI_HIST_SHEARSTRAIN
					MI_HIST_DISPLACEMENT11
					MI_HIST_DISPLACEMENT22
Additional Test Notes	LTXT		Additional Information	CES_ADDTESTNOTES	
Analysis Notes	LTXT		Additional Information	CES_ANALYSISNOTES	
Batch number	STXT		Additional Information	CES_BATCHNUMBER	
Data Ownership	DCT		Additional Information	CES_DATAOWNER	
Data Ownership (Other)	STXT		Additional Information	CES_DATAOWNER_OTHER	
Date of Analysis	DAT		Additional Information	CES_NC_ANALYSISDATE	
Date Test Performed	DAT		Additional Information	CES_TESTDATE	

TABLE A.1.—GENERIC TEST SUMMARY ATTRIBUTE SPECIFICATIONS

Database attribute name	Database data type[a]	Default units	Source data worksheet	Source data worksheet, data range name	Source data worksheet, parameter range name(s)
Displacement 11 Conversion	PNT		Additional Information	CES_NC_CONV_DISPLACE	
Displacement 11 Offset	PNT		Additional Information	CES_NC_OFFSET_DISPLACE	
Displacement 22 Conversion	PNT		Additional Information	CES_NC_CONV_DISPLACE22	
Displacement 22 Offset	PNT		Additional Information	CES_NC_OFFSET_DISPLACE22	
Rotation Conversion	PNT		Additional Information	CES_NC_CONV_ROTATION	
Rotation Offset	PNT		Additional Information	CES_NC_OFFSET_ROTATION	
Distribution Category	DCT		Additional Information	CES_DISTCAT	
Failure Location	LTXT		Additional Information	CES_FAILLOCATION	
Fracture Comments	LTXT		Additional Information	CES_FRACTURECOMMENTS	
Funding Organization	STXT		Additional Information	CES_FUNDINGORG	
Gauge Area	PNT	in^2	Additional Information	CES_NC_CROSS_SECTION	
Gauge Area @ Test Temp	PNT	in^2	Additional Information	CES_NC_GAGETESTTEMPAREA	
Gauge Cross-Section Geometry	DCT		Additional Information	CES_NC_SPEC_GEOMETRY	
Gauge Diameter @ Test Temp	PNT	in	Additional Information	CES_NC_GAGETESTTEMPDIAM	
Gauge Inner Diameter	PNT	in	Additional Information	CES_NC_INNER_DIAMETER	
Gauge Length	PNT	in	Additional Information	CES_NC_GAGELENGTH	
Gauge Outer Diameter	PNT	in	Additional Information	CES_NC_DIAMETER	
Gauge Thickness	PNT	in	Additional Information	CES_NC_THICKNESS	
Gauge Width	PNT	in	Additional Information	CES_NC_WIDTH	
Heat Number	STXT		Additional Information	CES_HEATNUMBER	
Heat Treatment	STXT		Additional Information	CES_HEATTREAT	
Hole Diameter	PNT	in	Additional Information	CES_NC_HOLEDIA	
Hole Location	STXT		Additional Information	CES_HOLELOC	
Institutional Standards	LTXT		Additional Information	CES_INSTSTANDARDS	
Load 11 Conversion	PNT		Additional Information	CES_NC_CONV_LOAD	
Load 11 Offset	PNT		Additional Information	CES_NC_OFFSET_LOAD	
Load 22 Conversion	PNT		Additional Information	CES_NC_CONV_LOAD22	
Load 22 Offset	PNT		Additional Information	CES_NC_OFFSET_LOAD22	
Load 12 Conversion	PNT		Additional Information	CES_NC_CONV_LOAD12	

TABLE A.1.—GENERIC TEST SUMMARY ATTRIBUTE SPECIFICATIONS

Database attribute name	Database data type[a]	Default units	Source data worksheet	Source data worksheet, data range name	Source data worksheet, parameter range name(s)
Load 12 Offset	PNT		Additional Information	CES_NC_OFFSET_LOAD12	
Load Measurement Method	DCT		Additional Information	CES_LOADMEASMETHOD	
Load Transducer Calibration	PNT		Additional Information	CES_NC_NC_LOAD_CAL	
Machining Method	DCT		Additional Information	CES_MACHINING_METHOD	
Machining Method (Other)	STXT		Additional Information	CES_MACININGMETHOD_OTHER	
Material Class	STXT		Additional Information	CES_MATERIAL_CLASS	
Material Designation	STXT		Additional Information	CES_MATERIALDES	
Material Name	STXT		Additional Information	CES_MATERIAL_NAME	
Material System	STXT		Additional Information	CES_MATERIAL_SYSTEM	
Metallography Comments	LTXT		Additional Information	CES_METCOMMENTS	
Mode of Heating	DCT		Additional Information	CES_HEATMODE	
Mode of Heating (Other)	STXT		Additional Information	CES_HEATMODE_OTHER	
NDE Comments	LTXT		Additional Information	CES_NDECOMMENTS	
Operator	STXT		Additional Information	CES_OPERATOR	
Original Data Filename	STXT		Additional Information	CES_NC_FILENAME	
Other Specimen Features	STXT		Additional Information	CES_SPECFEATURES	
Pretest Cycles	INT		Additional Information	CES_PRETESTCYCLES	
Pretest Environment	STXT		Additional Information	CES_PRETESTENV	
Pretest Exposure Time	PNT	hr	Additional Information	CES_PRETESTTIME	
Pretest Modulus @ RT	PNT	msi	Additional Information	CES_NC_PRETESTMOD	
Pretest Modulus @ Test Temp	PNT	msi	Additional Information	CES_NC_PRETESTTEMPMOD	
Pretest Notes	LTXT		Additional Information	CES_PRETESTNOTES	
Pretest Temperature	PNT	°F	Additional Information	CES_PRETESTTEMP	
Process	DCT		Additional Information	CES_PROCESS	
Product Form	DCT		Additional Information	CES_PRODFORM	
Product Thickness	PNT	in	Additional Information	CES_NC_PRODTHICK	
Project Code	STXT		Additional Information	CES_PROJECTCODE	
Project Name	STXT		Additional Information	CES_PROJECTNAME	
Project Notes	LTXT		Additional Information	CES_PROJNOTES	

TABLE A.1.—GENERIC TEST SUMMARY ATTRIBUTE SPECIFICATIONS

Database attribute name	Database data type[a]	Default units	Source data worksheet	Source data worksheet, data range name	Source data worksheet, parameter range name(s)
Report Number	STXT		Additional Information	CES_TESTINGNUMBER	
Sample Notes	LTXT		Additional Information	CES_SAMPLENOTES	
Soak Time	PNT	min	Additional Information	CES_SOAKTIME	
Specimen ID	STXT		Additional Information	CES_SPECIMENID	
Specimen Location	STXT		Additional Information	CES_SPECIMENLOC	
Specimen Orientation	DCT		Additional Information	CES_SPECIMENORIEN	
Specimen Specification	STXT		Additional Information	CES_SPECIMENSPEC	
Storage Condition	DCT		Additional Information	CES_STORCOND	
Storage Condition (Other)	STXT		Additional Information	CES_STORCOND_OTHER	
Strain 11 Conversion	PNT		Additional Information	CES_NC_CONV_STRAIN1	
Strain 11 Offset	PNT		Additional Information	CES_NC_OFFSET_STRAIN1	
Strain 22 Conversion	PNT		Additional Information	CES_NC_CONV_STRAIN2	
Strain 22 Offset	PNT		Additional Information	CES_NC_OFFSET_STRAIN2	
Strain 33 Conversion	PNT		Additional Information	CES_NC_CONV_STRAIN3	
Strain 33 Offset	PNT		Additional Information	CES_NC_OFFSET_STRAIN3	
Strain 12 Conversion	PNT		Additional Information	CES_NC_CONV_STRAIN12	
Strain 12 Offset	PNT		Additional Information	CES_NC_OFFSET_STRAIN12	
Strain Measurement (Other)	STXT		Additional Information	CES_STRAIN_MEASUREMENT_OTHER	
Strain Measurement Method	DCT		Additional Information	CES_STRAIN_MEASUREMENT	
Strain Transducer 1 Calibration	PNT		Additional Information	CES_NC_NC_STRAIN1_CAL	
Strain Transducer 1 Length	PNT	in	Additional Information	CES_NC_STRAIN1_LENGTH	
Strain Transducer 2 Calibration	PNT		Additional Information	CES_NC_NC_STRAIN2_CAL	
Strain Transducer 2 Length	PNT	in	Additional Information	CES_NC_STRAIN2_LENGTH	
Strain Transducer 3 Calibration	PNT		Additional Information	CES_NC_NC_STRAIN3_CAL	
Strain Transducer 3 Length	PNT	in	Additional Information	CES_NC_STRAIN3_LENGTH	
Stress 11 Conversion	PNT		Additional Information	CES_NC_CONV_STRESS	
Stress 11 Offset	PNT		Additional Information	CES_NC_OFFSET_STRESS	
Stress 22 Conversion	PNT		Additional Information	CES_NC_CONV_STRESS22	
Stress 22 Offset	PNT		Additional Information	CES_NC_OFFSET_STRESS22	

TABLE A.1.—GENERIC TEST SUMMARY ATTRIBUTE SPECIFICATIONS

Database attribute name	Database data type[a]	Default units	Source data worksheet	Source data worksheet, data range name	Source data worksheet, parameter range name(s)
Stress 12 Conversion	PNT		Additional Information	CES_NC_CONV_STRESS12	
Stress 12 Offset	PNT		Additional Information	CES_NC_OFFSET_STRESS12	
Surface Finish	DCT		Additional Information	CES_SURFINISH	
Surface Finish (Other)	STXT		Additional Information	CES_SURFINISH_OTHER	
Surface Roughness	PNT	mils	Additional Information	CES_NC_SURFROUGH	
Temperature Conversion	PNT		Additional Information	CES_NC_CONV_TEMP	
Temperature Offset	PNT		Additional Information	CES_NC_OFFSET_TEMP	
Temperature Measurement Method	DCT		Additional Information	CES_TEMPMETHOD	
Test Description	LTXT		Additional Information	CES_TESTDESCRIP	
Test Environment	DCT		Additional Information	CES_TESTENV	
Test Environment (Other)	STXT		Additional Information	CES_TESTENV_OTHER	
Test Humidity	PNT	%	Additional Information	CES_TESTRH	
Test Quality	INT		Additional Information	CES_NC_TESTQUALITY	
Test Temperature	PNT	°F	Additional Information	CES_NC_NC_TESTTEMP	
Test Type	DCT		Additional Information	CES_NC_TESTYPE	
Testing Contract	STXT		Additional Information	CES_TESTINGCONTRACT	
Testing Organisation	STXT		Additional Information	CES_TESTINGORG	
Testing Source Notes	LTXT		Additional Information	CES_TESTSOURCENOTES	
Testing Standards	STXT		Additional Information	CES_TESTSTANDARDS	
Time Conversion	PNT		Additional Information	CES_NC_CONV_TIME	
Time Offset	PNT		Additional Information	CES_NC_OFFSET_TIME	
Valid Test?	LOG		Additional Information	CES_NC_VALIDTEST	

[a]See Reference 5 for information on data types.

TABLE A.2.—GENERIC TEST SUMMARY ATTRIBUTE PARAMETER SPECIFICATIONS

Database parameter name	Default units	Source data worksheet	Source data worksheet, parameter range name
Time	s	Generic Data	MI_TIME_COL
Strain	%	Generic Data	MI_STRAIN11_COL
Strain	%	Generic Data	MI_STRAIN22_COL
Strain	%	Generic Data	MI_STRAIN33_COL
Strain	%	Generic Data	MI_SHEAR_STRAIN_COL
Test Temperature	°F	Generic Data	MI_TEMP_COL
Stage Name		Stage	MI_HIST_STAGENAME
Stage Type		Stage	MI_HIST_STAGETYPE
Control Mode		Stage	MI_HIST_CONTROLMODE
End Time	s	Stage	MI_HIST_TIME
Stress Rate (11-axis)	ksi/s	Stage	MI_HIST_STRESSRATE11
Stress Rate (22-axis)	ksi/s	Stage	MI_HIST_STRESSRATE22
Stress Rate (12-plane)	ksi/s	Stage	MI_HIST_SHEARSTRESSRATE
Load Rate (11-axis)	lbf/s	Stage	MI_HIST_LOADRATE11
Load Rate (22-axis)	lbf/s	Stage	MI_HIST_LOADRATE22
Load Rate (12-plane)	lbf/s	Stage	MI_HIST_SHEARLOADRATE
Strain Rate (11-axis)	%/s	Stage	MI_HIST_STRAINRATE11
Strain Rate (22-axis)	%/s	Stage	MI_HIST_STRAINRATE22
Strain Rate (33-axis)	%/s	Stage	MI_HIST_STRAINRATE33
Strain Rate (12-plane)	%/s	Stage	MI_HIST_SHEARSTRAINRATE
Displacement Rate (11-axis)	in/s	Stage	MI_HIST_DISPLACEMENTRATE11
Displacement Rate (22-axis)	in/s	Stage	MI_HIST_DISPLACEMENTRATE22
Rotation Rate	°/s	Stage	MI_HIST_ROTATIONRATE
Temperature Rate	°F/s	Stage	MI_HIST_TEMPRATE
Target Stress (11-axis)	ksi	Stage	MI_HIST_STRESS11
Target Stress (22-axis)	ksi	Stage	MI_HIST_STRESS22
Target Stress (12-plane)	ksi	Stage	MI_HIST_SHEARSTRESS
Target Load (11-axis)	lbf	Stage	MI_HIST_LOAD11
Target Load (22-axis)	lbf	Stage	MI_HIST_LOAD22

TABLE A.2.—GENERIC TEST SUMMARY ATTRIBUTE PARAMETER SPECIFICATIONS

Database parameter name	Default units	Source data worksheet	Source data worksheet, parameter range name
Target Load (12-plane)	lbf	Stage	MI_HIST_SHEARLOAD
Target Strain (11-axis)	%	Stage	MI_HIST_STRAIN11
Target Strain (22-axis)	%	Stage	MI_HIST_STRAIN22
Target Strain (33-axis)	%	Stage	MI_HIST_STRAIN33
Target Strain (12-plane)	%	Stage	MI_HIST_SHEARSTRAIN
Target Displacement (11-axis)	in	Stage	MI_HIST_DISPLACEMENT11
Target Displacement (22-axis)	in	Stage	MI_HIST_DISPLACEMENT22
Target Rotation	°	Stage	MI_HIST_ROTATION
Target Temperature	°F	Stage	MI_HIST_TEMP
Notes		Stage	MI_HIST_NOTE

TABLE A.3.—TENSILE AND COMPRESSION STAGE-BASED ATTRIBUTE SPECIFICATION

Database attribute name	Database data type[a]	Default units	Source data worksheet[b]	Source data worksheet, data range name[c]	Source data worksheet, parameter range name(s)
Record Name	RCN		Generic Data	MI_RECORDNAME	
Test ID	STXT		Generic Data	MI_RECORDNAME	
Material Class	STXT		Additional Information	CES_MATERIAL_CLASS	
Material Name	STXT		Additional Information	CES_MATERIAL_NAME	
Material System	STXT		Additional Information	CES_MATERIAL_SYSTEM	
Test Temperature	PNT	°F	Additional Information	CES_NC_NC_TESTTEMP	
Stage Stress (11 axis) vs Strain (11 axis)	FDA	ksi	Stage [x] Curves	MI_STAGE_STRESS11_[x]	MI_STAGE_STRAIN11_[x]
					MI_STAGE_SERIES_ID11_[x]
					MI_STAGE_NUM_[x]
Stage Stress (22 axis) vs Strain (22 axis)	FDA	ksi	Stage [x] Curves	MI_STAGE_STRESS22_[x]	MI_STAGE_STRAIN22_[x]
					MI_STAGE_SERIES_ID22_[x]
					MI_STAGE_NUM_[x]
Stage Stress (12 plane) vs Strain (12 plane)	FDA	ksi	Stage [x] Curves	MI_STAGE_STRESS12_[x]	MI_STAGE_STRAIN12_[x]
					MI_STAGE_SERIES_ID12_[x]
					MI_STAGE_NUM_[x]
Stage Poisson's Ratio vs. Strain (12 plane)	FDA		Stage [x] Curves	MI_STAGE_PR12_[x]	MI_STAGE_PR12_STRAIN11_[x]
					MI_STAGE_PR12_SERIES_ID_[x]
					MI_STAGE_NUM_[x]
Stage Poisson's Ratio vs. Strain (13 plane)	FDA		Stage [x] Curves	MI_STAGE_PR13_[x]	MI_STAGE_PR13_STRAIN11_[x]
					MI_STAGE_PR13_SERIES_ID_[x]
					MI_STAGE_NUM_[x]
Stage Poisson's Ratio vs. Strain (23 plane)	FDA		Stage [x] Curves	MI_STAGE_PR23_[x]	MI_STAGE_PR23_STRAIN22_[x]
					MI_STAGE_PR23_SERIES_ID_[x]
					MI_STAGE_NUM_[x]
Elastic Properties	TABL		Stage [x] Curves	MI_STAGE_NUM_[x]_01	GENERIC_STAGENAME_[x]
					GENERIC_MOD_[x]
					GENERIC_MOD22_[x]
					GENERIC_MOD12_[x]
					GENERIC_SECMOD_[x]

TABLE A.3.—TENSILE AND COMPRESSION STAGE-BASED ATTRIBUTE SPECIFICATION

Database attribute name	Database data type[a]	Default units	Source data worksheet[b]	Source data worksheet, data range name[c]	Source data worksheet, parameter range name(s)
					GENERIC_SECMOD22_[x]
					GENERIC_SECMOD12_[x]
					GENERIC_PR12_[x]
					GENERIC_PR13_[x]
					GENERIC_PR23_[x]
Inelastic Properties	TABL		Stage [x] Curves	MI_STAGE_NUM_[x]_01	GENERIC_STAGENAME_[x]
					GENERIC_HMOD1_[x]
					GENERIC_HMOD2_[x]
					GENERIC_HMOD1_22_[x]
					GENERIC_HMOD2_22_[x]
					GENERIC_HMOD1_12_[x]
					GENERIC_HMOD2_12_[x]
Yield Points	TABL		Stage [x] Curves	MI_STAGE_NUM_[x]_01	GENERIC_STAGENAME_[x]
					GENERIC_PYIELD_[x]
					GENERIC_PYIELD22_[x]
					GENERIC_PYIELD12_[x]
					GENERIC_YIELD_TYPE_LABEL_[x]
					GENERIC_OFFSET1_[x]
					GENERIC_OFFSET2_[x]
					GENERIC_OFFSET1_22_[x]
					GENERIC_OFFSET2_22_[x]
					GENERIC_OFFSET1_12_[x]
					GENERIC_OFFSET2_12_[x]
					GENERIC_UD_YIELD_LABEL_[x]
					GENERIC_OFFSET3_[x]
					GENERIC_OFFSET3_22_[x]
					GENERIC_OFFSET3_12_[x]
Failure Characteristics	TABL		Stage [x] Curves	MI_STAGE_NUM_[x]_01	GENERIC_STAGENAME_[x]
					GENERIC_UTS_[x]

TABLE A.3.—TENSILE AND COMPRESSION STAGE-BASED ATTRIBUTE SPECIFICATION

Database attribute name	Database data type[a]	Default units	Source data worksheet[b]	Source data worksheet, data range name[c]	Source data worksheet, parameter range name(s)
					GENERIC_UTS_STRAIN_[x]
					GENERIC_UTS22_[x]
					GENERIC_UTS_STRAIN22_[x]
					GENERIC_UTS12_[x]
					GENERIC_UTS_STRAIN12_[x]
					GENERIC_FAIL_[x]
					GENERIC_FAIL_STRAIN_[x]
					GENERIC_FAIL22_[x]
					GENERIC_FAIL_STRAIN22_[x]
					GENERIC_FAIL12_[x]
					GENERIC_FAIL_STRAIN12_[x]
					GENERIC_TOUGHNESS_[x]
					GENERIC_TOUGHNESS22_[x]
					GENERIC_TOUGHNESS12_[x]
Tensile/Compression Stage Notes	TABL		Stage [x] Curves	MI_STAGE_NUM_[x]_01	GENERIC_STAGENAME_[x]
					GENERIC_UNITS_NOTE_[x]
					GENERIC_SF_NOTE_[x]
					GENERIC_SF_NOTE22_[x]
					GENERIC_SF_NOTE12_[x]
					GENERIC_SEC_SF_NOTES_[x]
					GENERIC_SEC_SF_NOTES22_[x]
					GENERIC_SEC_SF_NOTES12_[x]
					GENERIC_STRAINRATE_NOTE_[x]
					GENERIC_STRAINRATE_NOTE22_[x]
					GENERIC_STRAINRATE_NOTE12_[x]
					GENERIC_STAGENAME_[x]

[a]See Reference 5 for information on data types.

[b][x] = stage number.

[c]For database attributes with a data type of FDA, the Range Name listed in this table will often represent the range name base for multiple named ranges on the corresponding Source Data Worksheet, with the full range name consisting of the Range Name as listed in the table, plus a sequential suffix of the form "_01", "_02", "_03," etc. This enables the associated data to be plotted on a single plot when uploaded to the database, with the plot identified by a single attribute name, and the individual series on the plot distinguished by the Series ID parameter value. See Table A.4 and Table A.5 for additional information.

TABLE A.4.—TENSILE AND COMPRESSION STAGE-BASED ATTRIBUTE PARAMETER SPECIFICATION

Database parameter name	Default units	Source data worksheet[a]	Source data worksheet, parameter range name[b]
Strain	%	Stage [x] Curves	MI_STAGE_STRAIN11_[x]
Series ID		Stage [x] Curves	MI_STAGE_SERIES_ID11_[x]
Stage Number		Stage [x] Curves	MI_STAGE_NUM_[x]
Strain	%	Stage [x] Curves	MI_STAGE_STRAIN22_[x]
Series ID		Stage [x] Curves	MI_STAGE_SERIES_ID22_[x]
Strain	%	Stage [x] Curves	MI_STAGE_STRAIN12_[x]
Series ID		Stage [x] Curves	MI_STAGE_SERIES_ID12_[x]
Strain	%	Stage [x] Curves	MI_STAGE_PR12_STRAIN11_[x]
Series ID		Stage [x] Curves	MI_STAGE_PR12_SERIES_ID_[x]
Strain	%	Stage [x] Curves	MI_STAGE_PR13_STRAIN11_[x]
Series ID		Stage [x] Curves	MI_STAGE_PR13_SERIES_ID_[x]
Strain	%	Stage [x] Curves	MI_STAGE_PR23_STRAIN22_[x]
Series ID		Stage [x] Curves	MI_STAGE_PR23_SERIES_ID_[x]
Stage Name		Stage [x] Curves	GENERIC_STAGENAME_[x]
Elastic Modulus (11 axis)	msi	Stage [x] Curves	GENERIC_MOD_[x]
Elastic Modulus (22 axis)	msi	Stage [x] Curves	GENERIC_MOD22_[x]
Elastic Modulus (12 plane)	msi	Stage [x] Curves	GENERIC_MOD12_[x]
Secondary Modulus (11 axis)	msi	Stage [x] Curves	GENERIC_SECMOD_[x]
Secondary Modulus (22 axis)	msi	Stage [x] Curves	GENERIC_SECMOD22_[x]
Secondary Modulus (12 plane)	msi	Stage [x] Curves	GENERIC_SECMOD12_[x]
Poisson's Ratio (12 plane)		Stage [x] Curves	GENERIC_PR12_[x]
Poisson's Ratio (13 plane)		Stage [x] Curves	GENERIC_PR13_[x]
Poisson's Ratio (23 plane)		Stage [x] Curves	GENERIC_PR23_[x]
Hardening Modulus (11 axis), 0.2% Yield to UTS	msi	Stage [x] Curves	GENERIC_HMOD1_[x]
Hardening Modulus (11 axis), 0.2% Yield to 1/2 (UTS - 0.2% Yield)	msi	Stage [x] Curves	GENERIC_HMOD2_[x]
Hardening Modulus (22 axis), 0.2% Yield to UTS	msi	Stage [x] Curves	GENERIC_HMOD1_22_[x]
Hardening Modulus (22 axis), 0.2% Yield to 1/2 (UTS - 0.2% Yield)	msi	Stage [x] Curves	GENERIC_HMOD2_22_[x]
Hardening Modulus (12 plane), 0.2% Yield to UTS	msi	Stage [x] Curves	GENERIC_HMOD1_12_[x]
Hardening Modulus (12 plane), 0.2% Yield to 1/2 (UTS - 0.2% Yield)	msi	Stage [x] Curves	GENERIC_HMOD2_12_[x]

TABLE A.4.—TENSILE AND COMPRESSION STAGE-BASED ATTRIBUTE PARAMETER SPECIFICATION

Database parameter name	Default units	Source data worksheet[a]	Source data worksheet, parameter range name[b]
Proportional Yield (11 axis)	ksi	Stage [x] Curves	GENERIC_PYIELD_[x]
Proportional Yield (22 axis)	ksi	Stage [x] Curves	GENERIC_PYIELD22_[x]
Proportional Yield (12 plane)	ksi	Stage [x] Curves	GENERIC_PYIELD12_[x]
Yield Type		Stage [x] Curves	GENERIC_YIELD_TYPE_LABEL_[x]
Yield Stress at 0.02% Offset (11 axis)	ksi	Stage [x] Curves	GENERIC_OFFSET1_[x]
Yield Stress at 0.2% Offset (11 axis)	ksi	Stage [x] Curves	GENERIC_OFFSET2_[x]
Yield Stress at 0.02% Offset (22 axis)	ksi	Stage [x] Curves	GENERIC_OFFSET1_22_[x]
Yield Stress at 0.2% Offset (22 axis)	ksi	Stage [x] Curves	GENERIC_OFFSET2_22_[x]
Yield Stress at 0.02% Offset (12 axis)	ksi	Stage [x] Curves	GENERIC_OFFSET1_12_[x]
Yield Stress at 0.2% Offset (12 axis)	ksi	Stage [x] Curves	GENERIC_OFFSET2_12_[x]
User-Defined Yield Description		Stage [x] Curves	GENERIC_UD_YIELD_LABEL_[x]
Yield Stress at User-Defined Offset (11 axis)	ksi	Stage [x] Curves	GENERIC_OFFSET3_[x]
Yield Stress at User-Defined Offset (22 axis)	ksi	Stage [x] Curves	GENERIC_OFFSET3_22_[x]
Yield Stress at User-Defined Offset (12 axis)	ksi	Stage [x] Curves	GENERIC_OFFSET3_12_[x]
UTS Stress (11 axis)	ksi	Stage [x] Curves	GENERIC_UTS_[x]
UTS Strain (11 axis)	%	Stage [x] Curves	GENERIC_UTS_STRAIN_[x]
UTS Stress (22 axis)	ksi	Stage [x] Curves	GENERIC_UTS22_[x]
UTS Strain (22 axis)	%	Stage [x] Curves	GENERIC_UTS_STRAIN22_[x]
UTS Stress (12 plane)	ksi	Stage [x] Curves	GENERIC_UTS12_[x]
UTS Strain (12 plane)	%	Stage [x] Curves	GENERIC_UTS_STRAIN12_[x]
Failure Strength, Stress (11-axis)	ksi	Stage [x] Curves	GENERIC_FAIL_[x]
Failure Strength, Strain (11 axis)	%	Stage [x] Curves	GENERIC_FAIL_STRAIN_[x]
Failure Strength, Stress (22 axis)	ksi	Stage [x] Curves	GENERIC_FAIL22_[x]
Failure Strength, Strain (22 axis)	%	Stage [x] Curves	GENERIC_FAIL_STRAIN22_[x]
Failure Strength, Stress (12 plane)	ksi	Stage [x] Curves	GENERIC_FAIL12_[x]
Failure Strength, Strain (12 plane)	%	Stage [x] Curves	GENERIC_FAIL_STRAIN12_[x]
Modulus of Toughness (11 axis)	msi	Stage [x] Curves	GENERIC_TOUGHNESS_[x]
Modulus of Toughness (22 axis)	msi	Stage [x] Curves	GENERIC_TOUGHNESS22_[x]
Modulus of Toughness (12 plane)	msi	Stage [x] Curves	GENERIC_TOUGHNESS12_[x]

TABLE A.4.—TENSILE AND COMPRESSION STAGE-BASED ATTRIBUTE PARAMETER SPECIFICATION

Database parameter name	Default units	Source data worksheet[a]	Source data worksheet, parameter range name[b]
Units Note		Stage [x] Curves	GENERIC_UNITS_NOTE_[x]
Modulus Calculation Note (11 axis)		Stage [x] Curves	GENERIC_SF_NOTE_[x]
Modulus Calculation Note (22 axis)		Stage [x] Curves	GENERIC_SF_NOTE22_[x]
Modulus Calculation Note (12 plane)		Stage [x] Curves	GENERIC_SF_NOTE12_[x]
Secondary Modulus Calculation Note (11 axis)		Stage [x] Curves	GENERIC_SEC_SF_NOTES_[x]
Secondary Modulus Calculation Note (22 axis)		Stage [x] Curves	GENERIC_SEC_SF_NOTES22_[x]
Secondary Modulus Calculation Note (12 plane)		Stage [x] Curves	GENERIC_SEC_SF_NOTES12_[x]
Strain Rate Note (11 axis)		Stage [x] Curves	GENERIC_STRAINRATE_NOTE_[x]
Strain Rate Note (22 axis)		Stage [x] Curves	GENERIC_STRAINRATE_NOTE22_[x]
Strain Rate Note (12 plane)		Stage [x] Curves	GENERIC_STRAINRATE_NOTE12_[x]

[a][x] = stage number.

[b]For parameters whose corresponding attribute's Data Type is FDA, whose range names begin with the MI_STAGE_ prefix, the range name listed in this table will often represent the range name base for multiple named ranges on the corresponding source data worksheet, with the full range name consisting of the range name as listed in the table, plus a sequential suffix of the form "_01", "_02", "_03," etc. This enables the associated values to be plotted on a single plot when uploaded to the database, with the plot identified by a single attribute name, and the individual series on the plot distinguished by the Series ID parameter value. See Table A.5 for additional information.

TABLE A.5.—TENSILE AND COMPRESSION STAGE FUNCTIONAL DATA SERIES SPECIFICATION

Database attribute name	Source data worksheet[a]	Source data worksheet, Series ID range name root[b]	Series ID range name suffix[b]	Series ID value[b]
Stage Stress (11 axis) vs Strain (11 axis)	Stage [x] Curves	MI_STAGE_SERIES_ID11_[x]	_01	Stress vs. Strain
			_02	Elastic Modulus Calculation Range
			_03	Elastic Modulus Linear Fit Line
			_04	Secondary Modulus Calculation Range
			_05	Secondary Modulus Linear Fit Line
			_06	Proportional Yield, 11-axis
			_07	0.02% Offset Point, 11-axis
			_08	0.2% Offset Point, 11-axis
			_09	User-Defined Offset Point, 11-axis
Stage Stress (22 axis) vs Strain (22 axis)	Stage [x] Curves	MI_STAGE_SERIES_ID22_[x]	_01	Stress vs. Strain
			_02	Elastic Modulus Calculation Range
			_03	Elastic Modulus Linear Fit Line
			_04	Secondary Modulus Calculation Range
			_05	Secondary Modulus Linear Fit Line
Stage Stress (12 plane) vs Strain (12 plane)	Stage [x] Curves	MI_STAGE_SERIES_ID12_[x]	_01	Stress vs. Strain
			_02	Elastic Modulus Calculation Range
			_03	Elastic Modulus Linear Fit Line
			_04	Secondary Modulus Calculation Range
			_05	Secondary Modulus Linear Fit Line
Stage Poisson's Ratio vs. Strain (12 plane)	Stage [x] Curves	MI_STAGE_PR12_SERIES_ID_[x]	_01	Poisson's Ratio 12 vs. Strain 11
			_02	Mean Elastic Poisson's Ratio 12
			_03	PR 12 @ Modulus Range Start
			_04	PR 12 @ Modulus Range End
Stage Poisson's Ratio vs. Strain (13 plane)	Stage [x] Curves	MI_STAGE_PR13_SERIES_ID_[x]	_01	Poisson's Ratio 13 vs. Strain 11
			_02	Mean Elastic Poisson's Ratio 13
			_03	PR 13 @ Modulus Range Start
			_04	PR 13 @ Modulus Range End
Stage Poisson's Ratio vs. Strain (23 plane)	Stage [x] Curves	MI_STAGE_PR23_SERIES_ID_[x]	_01	Poisson's Ratio 23 vs. Strain 22
			_02	Mean Elastic Poisson's Ratio 23
			_03	PR 23 @ Modulus Range Start
			_04	PR 23 @ Modulus Range End

[a][x] = stage number

[b]Series ID refers to the series identification.

TABLE A.6.—CREEP STAGE-BASED ATTRIBUTE SPECIFICATION

Database attribute name	Database data type[a]	Default units	Source data worksheet[b]	Source data worksheet, data range name[c]	Source data worksheet parameter range name(s)
Record Name	RCN		Generic Data	MI_RECORDNAME	
Test ID	STXT		Generic Data	MI_RECORDNAME	
Material Class	STXT		Additional Information	CES_MATERIAL_CLASS	
Material Name	STXT		Additional Information	CES_MATERIAL_NAME	
Material System	STXT		Additional Information	CES_MATERIAL_SYSTEM	
Test Temperature	PNT	°F	Additional Information	CES_NC_NC_TESTTEMP	
Stage Strain (11 axis) vs Time	FDA	%	Stage [x] Curves	MI_STAGE_STRAIN11_[x]	MI_STAGE_TIME_[x]
					MI_STAGE_STCHART_SERIES_ID11_[x]
					MI_STAGE_NUM_[x]
Stage Strain (22 axis) vs Time	FDA	%	Stage [x] Curves	MI_STAGE_STRAIN22_[x]	MI_STAGE_TIME_[x]
					MI_STAGE_STCHART_SERIES_ID22_[x]
					MI_STAGE_NUM_[x]
Stage Strain (33 axis) vs Time	FDA	%	Stage [x] Curves	MI_STAGE_STRAIN33_[x]	MI_STAGE_TIME_[x]
					MI_STAGE_STCHART_SERIES_ID33_[x]
					MI_STAGE_NUM_[x]
Stage Stress (11 axis) vs Strain (11 axis)	FDA	ksi	Stage [x] Curves	MI_STAGE_STRESS11_[x]	MI_STAGE_STRAIN11_[x]
					MI_STAGE_SSCHART_SERIES_ID11_[x]
					MI_STAGE_NUM_[x]
Stage Strain Rate (11 axis) vs Time	FDA	%/s	Stage [x] Curves	MI_STAGE_STRAINRATE_[x]	MI_STAGE_TIME_[x]
					MI_STAGE_SRTCHART_SERIES_ID11_[x]
					MI_STAGE_NUM_[x]
Stage Poisson's Ratio vs. Strain (12 plane)	FDA		Stage [x] Curves	MI_STAGE_PR12_[x]	MI_STAGE_PR12_STRAIN11_[x]
					MI_STAGE_PR12_CHART_SERIES_ID11_[x]
					MI_STAGE_NUM_[x]
Stage Poisson's Ratio vs. Strain (13 plane)	FDA		Stage [x] Curves	MI_STAGE_PR13_[x]	MI_STAGE_PR13_STRAIN11_[x]
					MI_STAGE_PR13_CHART_SERIES_ID11_[x]
					MI_STAGE_NUM_[x]
Stage Poisson's Ratio vs. Strain (23 plane)	FDA		Stage [x] Curves	MI_STAGE_PR23_[x]	MI_STAGE_PR23_STRAIN22_[x]
					MI_STAGE_PR23_CHART_SERIES_ID22_[x]

TABLE A.6.—CREEP STAGE-BASED ATTRIBUTE SPECIFICATION

Database attribute name	Database data type[a]	Default units	Source data worksheet[b]	Source data worksheet, data range name[c]	Source data worksheet parameter range name(s)
					MI_STAGE_NUM_[x]
Creep Zone Summary	TABL		Stage [x] Curves	MI_STAGE_NUM_[x]_01	GENERIC_STAGENAME_[x]
					GENERIC_PRIM_STARTTIME_[x]
					GENERIC_PRIM_ENDTIME_[x]
					GENERIC_PRIM_STRAINRATE_[x]
					GENERIC_SEC_STARTTIME_[x]
					GENERIC_SEC_ENDTIME_[x]
					GENERIC_SEC_STRAINRATE_[x]
					GENERIC_SEC_R2_[x]
					GENERIC_TERT_STARTTIME_[x]
					GENERIC_TERT_ENDTIME_[x]
					GENERIC_TERT_STRAINRATE_[x]
Creep Stage Summary	TABL		Stage [x] Curves	MI_STAGE_NUM_[x]_01	GENERIC_STAGENAME_[x]
					GENERIC_FAIL_TIME_[x]
					GENERIC_FAIL_STRAIN_[x]
					GENERIC_STRAIN1_PC_[x]
					GENERIC_STRAIN1_TIME_[x]
					GENERIC_STRAIN2_PC_[x]
					GENERIC_STRAIN2_TIME_[x]
					GENERIC_UNITS_NOTE_[x]

[a]See Reference 5 for information on data types.

[b][x] = stage number.

[c]For database attributes with a data type of FDA, the range name listed in the table will often represent the range name base for multiple named ranges on the corresponding source data worksheet, with the full range name consisting of the range name as listed in the table, plus a sequential suffix of the form "_01", "_02", "_03," etc. This enables the associated data to be plotted on a single plot when uploaded to the database, with the plot identified by a single attribute name, and the individual series on the plot distinguished by the Series ID parameter value. See Table A.7 and Table A.8 for additional information.

TABLE A.7.—CREEP STAGE-BASED ATTRIBUTE PARAMETER SPECIFICATION

Database parameter name	Default units	Source data worksheet[a]	Source data worksheet, parameter range name[b]
Time	s	Stage [x] Curves	MI_STAGE_TIME_[x]
Series ID		Stage [x] Curves	MI_STAGE_STCHART_SERIES_ID11_[x]
Stage Number		Stage [x] Curves	MI_STAGE_NUM_[x]
Series ID		Stage [x] Curves	MI_STAGE_STCHART_SERIES_ID22_[x]
Series ID		Stage [x] Curves	MI_STAGE_STCHART_SERIES_ID33_[x]
Strain	%	Stage [x] Curves	MI_STAGE_STRAIN11_[x]
Series ID		Stage [x] Curves	MI_STAGE_SSCHART_SERIES_ID11_[x]
Series ID		Stage [x] Curves	MI_STAGE_SRTCHART_SERIES_ID11_[x]
Strain	%	Stage [x] Curves	MI_STAGE_PR12_STRAIN11_[x]
Series ID		Stage [x] Curves	MI_STAGE_PR12_CHART_SERIES_ID11_[x]
Strain	%	Stage [x] Curves	MI_STAGE_PR13_STRAIN11_[x]
Series ID		Stage [x] Curves	MI_STAGE_PR13_CHART_SERIES_ID11_[x]
Strain	%	Stage [x] Curves	MI_STAGE_PR23_STRAIN22_[x]
Series ID		Stage [x] Curves	MI_STAGE_PR23_CHART_SERIES_ID22_[x]
Stage Name		Stage [x] Curves	GENERIC_STAGENAME_[x]
Primary Strain Response, Start	s	Stage [x] Curves	GENERIC_PRIM_STARTTIME_[x]
Primary Strain Response, Finish	s	Stage [x] Curves	GENERIC_PRIM_ENDTIME_[x]
Primary Strain Response, Strain Rate (secant)	%/s	Stage [x] Curves	GENERIC_PRIM_STRAINRATE_[x]
Secondary Strain Response, Start	s	Stage [x] Curves	GENERIC_SEC_STARTTIME_[x]
Secondary Strain Response, Finish	s	Stage [x] Curves	GENERIC_SEC_ENDTIME_[x]
Secondary Strain Response, Strain Rate (slope)	%/s	Stage [x] Curves	GENERIC_SEC_STRAINRATE_[x]
Secondary Strain Response, R^2		Stage [x] Curves	GENERIC_SEC_R2_[x]
Tertiary Strain Response, Start	s	Stage [x] Curves	GENERIC_TERT_STARTTIME_[x]
Tertiary Strain Response, Finish	s	Stage [x] Curves	GENERIC_TERT_ENDTIME_[x]
Tertiary Strain Response, Strain Rate (secant)	%/s	Stage [x] Curves	GENERIC_TERT_STRAINRATE_[x]
Failure Point, Time	s	Stage [x] Curves	GENERIC_FAIL_TIME_[x]
Creep Strain at Failure	%	Stage [x] Curves	GENERIC_FAIL_STRAIN_[x]
Creep Strain 1	%	Stage [x] Curves	GENERIC_STRAIN1_PC_[x]
Time to Creep Strain 1	s	Stage [x] Curves	GENERIC_STRAIN1_TIME_[x]

TABLE A.7.—CREEP STAGE-BASED ATTRIBUTE PARAMETER SPECIFICATION

Database parameter name	Default units	Source data worksheet[a]	Source data worksheet, parameter range name[b]
Creep Strain 2	%	Stage [x] Curves	GENERIC_STRAIN2_PC_[x]
Time to Creep Strain 2	s	Stage [x] Curves	GENERIC_STRAIN2_TIME_[x]
Units System Note		Stage [x] Curves	GENERIC_UNITS_NOTE_[x]

[a][x] = stage number.

[b]For parameters whose corresponding attribute's data type is FDA, whose range names begin with the "MI_STAGE_" prefix, the range name listed in this table will often represent the range name base for multiple named ranges on the corresponding source data worksheet, with the full range name consisting of the range name as listed in the table, plus a sequential suffix of the form "_01", "_02", "_03," etc. This enables the associated values to be plotted on a single plot when uploaded to the database, with the plot identified by a single attribute name, and the individual series on the plot distinguished by the Series ID parameter value. See Table A.8 for additional information.

TABLE A.8.—CREEP STAGE FUNCTIONAL DATA SERIES SPECIFICATION

Database attribute name	Source data worksheet[a]	Source data worksheet, Series ID range name root[b]	Series ID range name suffix[b]	Series ID value[b]
Stage Strain (11 axis) vs Time	Stage [x] Curves	MI_STAGE_STCHART_SERIES_ID11_[x]	_01	Strain vs. Time - 11 Axis
			_02	Primary Strain Response Zone
			_03	Secondary Strain Response Zone
			_04	Tertiary Strain Response Zone
			_05	Creep Strain vs. Time - 11 Axis
			_06	Creep Strain - Primary Response Zone
			_07	Creep Strain - Secondary Response Zone
			_08	Creep Strain - Tertiary Response Zone
			_09	Failure Point
			_10	Time to Strain, Creep Strain 1
			_11	Time to Strain, Creep Strain 2
Stage Strain (22 axis) vs Time	Stage [x] Curves	MI_STAGE_STCHART_SERIES_ID22_[x]	_01	Strain vs. Time - 22 Axis
			_02	Primary Strain Response Zone
			_03	Secondary Strain Response Zone
			_04	Tertiary Strain Response Zone
			_05	Creep Strain vs. Time - 22 Axis
Stage Strain (33 axis) vs Time	Stage [x] Curves	MI_STAGE_STCHART_SERIES_ID33_[x]	_01	Strain vs. Time - 33 Axis
			_02	Primary Strain Response Zone
			_03	Secondary Strain Response Zone
			_04	Tertiary Strain Response Zone
			_05	Creep Strain vs. Time - 33 Axis
Stage Stress (11 axis) vs Strain (11 axis)	Stage [x] Curves	MI_STAGE_SSCHART_SERIES_ID11_[x]	_01	Stress vs. Strain - 11 Axis
			_02	Primary Strain Response Zone
			_03	Secondary Strain Response Zone
			_04	Tertiary Strain Response Zone
Stage Strain Rate (11 axis) vs Time	Stage [x] Curves	MI_STAGE_SRTCHART_SERIES_ID11_[x]	_01	Strain Rate vs. Time - 11 Axis
			_02	Primary Strain Response Zone
			_03	Secondary Strain Response Zone
			_04	Tertiary Strain Response Zone

TABLE A.8.—CREEP STAGE FUNCTIONAL DATA SERIES SPECIFICATION

Database attribute name	Source data worksheet[a]	Source data worksheet, Series ID range name root[b]	Series ID range name suffix[b]	Series ID value[b]
Stage Poisson's Ratio vs. Strain (12 plane)	Stage [x] Curves	MI_STAGE_PR12_CHART_SERIES_ID11_[x]	_01	12 Plane
Stage Poisson's Ratio vs. Strain (13 plane)	Stage [x] Curves	MI_STAGE_PR13_CHART_SERIES_ID11_[x]	_01	13 Plane
Stage Poisson's Ratio vs. Strain (23 plane)	Stage [x] Curves	MI_STAGE_PR23_CHART_SERIES_ID22_[x]	_01	23 Plane

[a][x] = stage number.
[b]Series ID refers to the series identification.

TABLE A.9.—RELAXATION STAGE-BASED ATTRIBUTE SPECIFICATION

Database attribute name	Database data type[a]	Default units	Source data worksheet[b]	Source data worksheet, data range name	Source data worksheet, parameter range name(s)
Record Name	RCN		Generic Data	MI_RECORDNAME	
Test ID	STXT		Generic Data	MI_RECORDNAME	
Material Class	STXT		Additional Information	CES_MATERIAL_CLASS	
Material Name	STXT		Additional Information	CES_MATERIAL_NAME	
Material System	STXT		Additional Information	CES_MATERIAL_SYSTEM	
Test Temperature	PNT	°F	Additional Information	CES_NC_NC_TESTTEMP	
Stage Stress (11 axis) vs Time	FDA	ksi	Stage [x] Curves	MI_STAGE_STRESS11_[x]	MI_STAGE_TIME_[x]
					MI_STAGE_NUM_[x]
Stage Stress (22 axis) vs Time	FDA	ksi	Stage [x] Curves	MI_STAGE_STRESS22_[x]	MI_STAGE_TIME_[x]
					MI_STAGE_NUM_[x]
Stage Stress (12 plane) vs Time	FDA	ksi	Stage [x] Curves	MI_STAGE_STRESS12_[x]	MI_STAGE_TIME_[x]
					MI_STAGE_NUM_[x]
Stage Stress Rate (11 axis) vs Time	FDA	ksi/s	Stage [x] Curves	MI_STAGE_STRESSRATE11_[x]	MI_STAGE_TIME_[x]
					MI_STAGE_NUM_[x]
Stage Stress Rate (22 axis) vs Time	FDA	ksi/s	Stage [x] Curves	MI_STAGE_STRESSRATE22_[x]	MI_STAGE_TIME_[x]
					MI_STAGE_NUM_[x]
Stage Stress Rate (12 plane) vs Time	FDA	ksi/s	Stage [x] Curves	MI_STAGE_STRESSRATE12_[x]	MI_STAGE_TIME_[x]
					MI_STAGE_NUM_[x]
Stage Strain (11 axis) vs Time	FDA	%	Stage [x] Curves	MI_STAGE_STRAIN11_[x]	MI_STAGE_TIME_[x]
					MI_STAGE_NUM_[x]
Stage Strain (22 axis) vs Time	FDA	%	Stage [x] Curves	MI_STAGE_STRAIN22_[x]	MI_STAGE_TIME_[x]
					MI_STAGE_NUM_[x]
Stage Strain (33 axis) vs Time	FDA	%	Stage [x] Curves	MI_STAGE_STRAIN33_[x]	MI_STAGE_TIME_[x]
					MI_STAGE_NUM_[x]
Stage Strain (12 plane) vs Time		%	Stage [x] Curves	MI_STAGE_STRAIN12_[x]	MI_STAGE_TIME_[x]
					MI_STAGE_NUM_[x]
Relaxation Stage Summary	TABL		Stage [x] Curves	MI_STAGE_NUM_[x]	GENERIC_STAGENAME_[x]
					GENERIC_TESTSTRAIN11_[x]
					GENERIC_TESTSTRAIN22_[x]

TABLE A.9.—RELAXATION STAGE-BASED ATTRIBUTE SPECIFICATION

Database attribute name	Database data type[a]	Default units	Source data worksheet[b]	Source data worksheet, data range name	Source data worksheet, parameter range name(s)
					GENERIC_TESTSTRAIN33_[x]
					GENERIC_TESTSTRAIN12_[x]
					GENERIC_RELAX_STARTTIME_[x]
					GENERIC_RELAX_ENDTIME_[x]
					GENERIC_RELAX_STARTLOAD11_[x]
					GENERIC_RELAX_ENDLOAD11_[x]
					GENERIC_RELAX_STARTLOAD22_[x]
					GENERIC_RELAX_ENDLOAD22_[x]
					GENERIC_RELAX_STARTLOAD12_[x]
					GENERIC_RELAX_ENDLOAD12_[x]
					GENERIC_UNITS_NOTE_[x]
					GENERIC_STAGENAME_[x]

[a]See Reference 5 for information on data types.

[b][x] = stage number.

TABLE A.10.—RELAXATION STAGE-BASED ATTRIBUTE PARAMETER SPECIFICATION

Database parameter name	Default units	Source data worksheet[a]	Source data worksheet, parameter range name
Time	s	Stage [x] Curves	MI_STAGE_TIME_[x]
Stage Number		Stage [x] Curves	MI_STAGE_NUM_[x]
Stage Name		Stage [x] Curves	GENERIC_STAGENAME_[x]
Test Strain (11-axis)	%	Stage [x] Curves	GENERIC_TESTSTRAIN11_[x]
Test Strain (22-axis)	%	Stage [x] Curves	GENERIC_TESTSTRAIN22_[x]
Test Strain (33-axis)	%	Stage [x] Curves	GENERIC_TESTSTRAIN33_[x]
Test Strain (12-plane)	%	Stage [x] Curves	GENERIC_TESTSTRAIN12_[x]
Constant Strain Zone Start Time	s	Stage [x] Curves	GENERIC_RELAX_STARTTIME_[x]
Constant Strain Zone End Time	s	Stage [x] Curves	GENERIC_RELAX_ENDTIME_[x]
Load at Start (11-axis)	ksi	Stage [x] Curves	GENERIC_RELAX_STARTLOAD11_[x]
Load at End (11-axis)	ksi	Stage [x] Curves	GENERIC_RELAX_ENDLOAD11_[x]
Load at Start (22-axis)	ksi	Stage [x] Curves	GENERIC_RELAX_STARTLOAD22_[x]
Load at End (22-axis)	ksi	Stage [x] Curves	GENERIC_RELAX_ENDLOAD22_[x]
Load at Start (12-plane)	ksi	Stage [x] Curves	GENERIC_RELAX_STARTLOAD12_[x]
Load at End (12-plane)	ksi	Stage [x] Curves	GENERIC_RELAX_ENDLOAD12_[x]
Units Note		Stage [x] Curves	GENERIC_UNITS_NOTE_[x]

[a][x] = stage number.

TABLE A.11.—GENERIC CYCLIC TEST SUMMARY ATTRIBUTE SPECIFICATION

Database attribute name	Database data type[a]	Default units	Source data worksheet[b]	Source data worksheet, data range name	Source data worksheet, parameter range name(s)[c]
Record Name	RCN		Generic Data	MI_RECORDNAME	
Test ID	STXT		Generic Data	MI_RECORDNAME	
Additional Test Notes	LTXT		Additional Information	CES_ADDTESTNOTES	
Analysis Notes	LTXT		Additional Information	CES_ANALYSISNOTES	
Batch number	STXT		Additional Information	CES_BATCHNUMBER	
Data Ownership	DCT		Additional Information	CES_DATAOWNER	
Data Ownership (Other)	STXT		Additional Information	CES_DATAOWNER_OTHER	
Date of Analysis	DAT		Additional Information	CES_NC_ANALYSISDATE	
Date Test Performed	DAT		Additional Information	CES_TESTDATE	
Displacement 11 Conversion	PNT		Additional Information	CES_NC_CONV_DISPLACE	
Displacement 11 Offset	PNT		Additional Information	CES_NC_OFFSET_DISPLACE	
Displacement 22 Conversion	PNT		Additional Information	CES_NC_CONV_DISPLACE22	
Displacement 22 Offset	PNT		Additional Information	CES_NC_OFFSET_DISPLACE22	
Rotation Conversion	PNT		Additional Information	CES_NC_CONV_ROTATION	
Rotation Offset	PNT		Additional Information	CES_NC_OFFSET_ROTATION	
Distribution Category	DCT		Additional Information	CES_DISTCAT	
Failure Location	LTXT		Additional Information	CES_FAILLOCATION	
Fracture Comments	LTXT		Additional Information	CES_FRACTURECOMMENTS	
Funding Organization	STXT		Additional Information	CES_FUNDINGORG	
Gauge Area	PNT	in^2	Additional Information	CES_NC_CROSS_SECTION	
Gauge Area @ Test Temp	PNT	in^2	Additional Information	CES_NC_GAGETESTTEMPAREA	
Gauge Cross-Section Geometry	DCT		Additional Information	CES_NC_SPEC_GEOMETRY	
Gauge Diameter @ Test Temp	PNT	in	Additional Information	CES_NC_GAGETESTTEMPDIAM	
Gauge Inner Diameter	PNT	in	Additional Information	CES_NC_INNER_DIAMETER	
Gauge Length	PNT	in	Additional Information	CES_NC_GAGELENGTH	
Gauge Outer Diameter	PNT	in	Additional Information	CES_NC_DIAMETER	
Gauge Thickness	PNT	in	Additional Information	CES_NC_THICKNESS	
Gauge Width	PNT	in	Additional Information	CES_NC_WIDTH	
Heat Number	STXT		Additional Information	CES_HEATNUMBER	
Heat Treatment	STXT		Additional Information	CES_HEATTREAT	
Hole Diameter	PNT	in	Additional Information	CES_NC_HOLEDIA	
Hole Location	STXT		Additional Information	CES_HOLELOC	

TABLE A.11.—GENERIC CYCLIC TEST SUMMARY ATTRIBUTE SPECIFICATION

Database attribute name	Database data type[a]	Default units	Source data worksheet[b]	Source data worksheet, data range name	Source data worksheet, parameter range name(s)[c]
Institutional Standards	LTXT		Additional Information	CES_INSTSTANDARDS	
Load 11 Conversion	PNT		Additional Information	CES_NC_CONV_LOAD	
Load 11 Offset	PNT		Additional Information	CES_NC_OFFSET_LOAD	
Load 22 Conversion	PNT		Additional Information	CES_NC_CONV_LOAD22	
Load 22 Offset	PNT		Additional Information	CES_NC_OFFSET_LOAD22	
Load 12 Conversion	PNT		Additional Information	CES_NC_CONV_LOAD12	
Load 12 Offset	PNT		Additional Information	CES_NC_OFFSET_LOAD12	
Load Measurement Method	DCT		Additional Information	CES_LOADMEASMETHOD	
Load Transducer Calibration	PNT		Additional Information	CES_NC_NC_LOAD_CAL	
Machining Method	DCT		Additional Information	CES_MACHINING_METHOD	
Machining Method (Other)	STXT		Additional Information	CES_MACININGMETHOD_OTHER	
Material Class	STXT		Additional Information	CES_MATERIAL_CLASS	
Material Designation	STXT		Additional Information	CES_MATERIALDES	
Material Name	STXT		Additional Information	CES_MATERIAL_NAME	
Material System	STXT		Additional Information	CES_MATERIAL_SYSTEM	
Metallography Comments	LTXT		Additional Information	CES_METCOMMENTS	
Mode of Heating	DCT		Additional Information	CES_HEATMODE	
Mode of Heating (Other)	STXT		Additional Information	CES_HEATMODE_OTHER	
NDE Comments	LTXT		Additional Information	CES_NDECOMMENTS	
Operator	STXT		Additional Information	CES_OPERATOR	
Original Data Filename	STXT		Additional Information	CES_NC_FILENAME	
Other Specimen Features	STXT		Additional Information	CES_SPECFEATURES	
Pretest Cycles	INT		Additional Information	CES_PRETESTCYCLES	
Pretest Environment	STXT		Additional Information	CES_PRETESTENV	
Pretest Exposure Time	PNT	hr	Additional Information	CES_PRETESTTIME	
Pretest Modulus @ RT	PNT	msi	Additional Information	CES_NC_PRETESTMOD	
Pretest Modulus @ Test Temp	PNT	msi	Additional Information	CES_NC_PRETESTTEMPMOD	
Pretest Notes	LTXT		Additional Information	CES_PRETESTNOTES	
Pretest Temperature	PNT	°F	Additional Information	CES_PRETESTTEMP	
Process	DCT		Additional Information	CES_PROCESS	
Product Form	DCT		Additional Information	CES_PRODFORM	
Product Thickness	PNT	in	Additional Information	CES_NC_PRODTHICK	

TABLE A.11.—GENERIC CYCLIC TEST SUMMARY ATTRIBUTE SPECIFICATION

Database attribute name	Database data type[a]	Default units	Source data worksheet[b]	Source data worksheet, data range name	Source data worksheet, parameter range name(s)[c]
Project Code	STXT		Additional Information	CES_PROJECTCODE	
Project Name	STXT		Additional Information	CES_PROJECTNAME	
Project Notes	LTXT		Additional Information	CES_PROJNOTES	
Report Number	STXT		Additional Information	CES_TESTINGNUMBER	
Sample Notes	LTXT		Additional Information	CES_SAMPLENOTES	
Soak Time	PNT	min	Additional Information	CES_SOAKTIME	
Specimen ID	STXT		Additional Information	CES_SPECIMENID	
Specimen Location	STXT		Additional Information	CES_SPECIMENLOC	
Specimen Orientation	DCT		Additional Information	CES_SPECIMENORIEN	
Specimen Specification	STXT		Additional Information	CES_SPECIMENSPEC	
Storage Condition	DCT		Additional Information	CES_STORCOND	
Storage Condition (Other)	STXT		Additional Information	CES_STORCOND_OTHER	
Strain 11 Conversion	PNT		Additional Information	CES_NC_CONV_STRAIN1	
Strain 11 Offset	PNT		Additional Information	CES_NC_OFFSET_STRAIN1	
Strain 22 Conversion	PNT		Additional Information	CES_NC_CONV_STRAIN2	
Strain 22 Offset	PNT		Additional Information	CES_NC_OFFSET_STRAIN2	
Strain 33 Conversion	PNT		Additional Information	CES_NC_CONV_STRAIN3	
Strain 33 Offset	PNT		Additional Information	CES_NC_OFFSET_STRAIN3	
Strain 12 Conversion	PNT		Additional Information	CES_NC_CONV_STRAIN12	
Strain 12 Offset	PNT		Additional Information	CES_NC_OFFSET_STRAIN12	
Strain Measurement (Other)	STXT		Additional Information	CES_STRAIN_MEASUREMENT_OTHER	
Strain Measurement Method	DCT		Additional Information	CES_STRAIN_MEASUREMENT	
Strain Transducer 1 Calibration	PNT		Additional Information	CES_NC_NC_STRAIN1_CAL	
Strain Transducer 1 Length	PNT	in	Additional Information	CES_NC_STRAIN1_LENGTH	
Strain Transducer 2 Calibration	PNT		Additional Information	CES_NC_NC_STRAIN2_CAL	
Strain Transducer 2 Length	PNT	in	Additional Information	CES_NC_STRAIN2_LENGTH	
Strain Transducer 3 Calibration	PNT		Additional Information	CES_NC_NC_STRAIN3_CAL	
Strain Transducer 3 Length	PNT	in	Additional Information	CES_NC_STRAIN3_LENGTH	
Stress 11 Conversion	PNT		Additional Information	CES_NC_CONV_STRESS	
Stress 11 Offset	PNT		Additional Information	CES_NC_OFFSET_STRESS	
Stress 22 Conversion	PNT		Additional Information	CES_NC_CONV_STRESS22	
Stress 22 Offset	PNT		Additional Information	CES_NC_OFFSET_STRESS22	

TABLE A.11.—GENERIC CYCLIC TEST SUMMARY ATTRIBUTE SPECIFICATION

Database attribute name	Database data type[a]	Default units	Source data worksheet[b]	Source data worksheet, data range name	Source data worksheet, parameter range name(s)[c]
Stress 12 Conversion	PNT		Additional Information	CES_NC_CONV_STRESS12	
Stress 12 Offset	PNT		Additional Information	CES_NC_OFFSET_STRESS12	
Surface Finish	DCT		Additional Information	CES_SURFINISH	
Surface Finish (Other)	STXT		Additional Information	CES_SURFINISH_OTHER	
Surface Roughness	PNT	mils	Additional Information	CES_NC_SURFROUGH	
Temperature Conversion	PNT		Additional Information	CES_NC_CONV_TEMP	
Temperature Offset	PNT		Additional Information	CES_NC_OFFSET_TEMP	
Temperature Measurement Method	DCT		Additional Information	CES_TEMPMETHOD	
Test Description	LTXT		Additional Information	CES_TESTDESCRIP	
Test Environment	DCT		Additional Information	CES_TESTENV	
Test Environment (Other)	STXT		Additional Information	CES_TESTENV_OTHER	
Test Humidity	PNT	%	Additional Information	CES_TESTRH	
Test Quality	INT		Additional Information	CES_NC_TESTQUALITY	
Test Temperature	PNT	°F	Additional Information	CES_NC_NC_TESTTEMP	
Test Type	DCT		Additional Information	CES_NC_TESTYPE	
Testing Contract	STXT		Additional Information	CES_TESTINGCONTRACT	
Testing Organisation	STXT		Additional Information	CES_TESTINGORG	
Testing Source Notes	LTXT		Additional Information	CES_TESTSOURCENOTES	
Testing Standards	STXT		Additional Information	CES_TESTSTANDARDS	
Time Conversion	PNT		Additional Information	CES_NC_CONV_TIME	
Time Offset	PNT		Additional Information	CES_NC_OFFSET_TIME	
Valid Test?	LOG		Additional Information	CES_NC_VALIDTEST	
Cyclic Stage 1 Stress vs Strain (11-axis)	FDA	ksi	Cycle Data 1	CES_EXPORT_TENSILE_STRESS	CES_EXPORT_TENSILE_STRAIN1
Cyclic Stage 1 Stress (11-axis) vs Strain (22-axis)	FDA	ksi	Cycle Data 1	CES_EXPORT_TENSILE_STRESS	CES_EXPORT_TENSILE_STRAIN2
Cyclic Stage 1 Stress (11-axis) vs Time	FDA	ksi	Cycle Data 1	CES_EXPORT_TENSILE_STRESS	CES_EXPORT_TENSILE_TIME
Cyclic Stage 1 Strain (11-axis) vs Time	FDA	%	Cycle Data 1	CES_EXPORT_TENSILE_STRAIN1	CES_EXPORT_TENSILE_TIME
Cyclic Stage 1 Strain (22-axis) vs Time	FDA	%	Cycle Data 1	CES_EXPORT_TENSILE_STRAIN2	CES_EXPORT_TENSILE_TIME
Cyclic Stage 1 Modulus Comments	LTXT		Cycle Data 1	FAT_CYCLE_1_L_MODULUS_NOTE	
Cyclic Stage 1 Young's Modulus (11-axis)	PNT	msi	Cycle Data 1	FAT_CYCLE_1_L_MOD_VALUE	
Cyclic Stage 1 Young's Modulus (22-axis)	PNT	msi	Cycle Data 1	FAT_CYCLE_1_L_MOD22_VALUE	
Cyclic Stage 1 Young's Modulus (33-axis)	PNT	msi	Cycle Data 1	FAT_CYCLE_1_L_MOD33_VALUE	
Cyclic Stage 1 Elastic Poisson's Ratio (12-plane)	PNT		Cycle Data 1	FAT_CYCLE_1_L_PR12	

TABLE A.11.—GENERIC CYCLIC TEST SUMMARY ATTRIBUTE SPECIFICATION

Database attribute name	Database data type[a]	Default units	Source data worksheet[b]	Source data worksheet, data range name	Source data worksheet, parameter range name(s)[c]
Cyclic Stage 1 Elastic Poisson's Ratio (13-plane)	PNT		Cycle Data 1	FAT_CYCLE_1_L_PR13	
Cyclic Stage 1 Elastic Poisson's Ratio (23-plane)	PNT		Cycle Data 1	FAT_CYCLE_1_L_PR23	
Cyclic Stage 1 Proportional Yield Stress	PNT	ksi	Cycle Data 1	FAT_CYCLE_1_L_PYIELD_STRESS	
Cyclic Stage 1 Yield Stress at 0.02% Offset	PNT	ksi	Cycle Data 1	FAT_CYCLE_1_L_OFFSET1_STRESS	
Cyclic Stage 1 Yield Stress at 0.2% Offset	PNT	ksi	Cycle Data 1	FAT_CYCLE_1_L_OFFSET2_STRESS	
Cyclic Stage 1 Yield Stress at User Defined Offset	PNT	ksi	Cycle Data 1	FAT_CYCLE_1_L_OFFSET3_STRESS	
Cyclic Stage 1 User Defined Offset	PNT	%	Cycle Data 1	FAT_CYCLE_1_L_OFFSET3_OFFSET	
Hysteresis Loops (11-axis)	FDA	ksi	Cycle Data [y]	CES_EXPORT_STRESS_IMP	CES_EXPORT_STRAIN1
					CES_EXPORT_CYCLE
Cyclic Stress (11-axis) vs Time	FDA	ksi	Cycle Data [y]	CES_EXPORT_STRESS_IMP	CES_EXPORT_TIME
					CES_EXPORT_CYCLE
Cyclic Strain (11-axis) vs Time	FDA	%	Cycle Data [y]	CES_EXPORT_STRAIN1	CES_EXPORT_TIME
					CES_EXPORT_CYCLE
Hysteresis Loops (22-axis)	FDA	ksi	Cycle Data [y]	CES_EXPORT_STRESS_IMP	CES_EXPORT_STRAIN2
					CES_EXPORT_CYCLE
Cyclic Strain (22-axis) vs Time	FDA	%	Cycle Data [y]	CES_EXPORT_STRAIN2	CES_EXPORT_TIME
					CES_EXPORT_CYCLE
Maximum Stress vs Cycle	FDA	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_STRESS_MAX_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
Minimum Stress vs Cycle	FDA	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_STRESS_MIN_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
Mean Stress vs Cycle	FDA	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_STRESS_MEAN_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
Stress Amplitude vs Cycle	FDA	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_STRESS_AMP_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
Maximum Strain vs Cycle	FDA	%	Test Summary (Imperial Units)	FAT_IMPSUM_STRAIN_MAX_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
Minimum Strain vs Cycle	FDA	%	Test Summary (Imperial Units)	FAT_IMPSUM_STRAIN_MIN_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
Total Strain Range vs Cycles	FDA	%	Test Summary (Imperial Units)	FAT_IMPSUM_TSR_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
Mean Strain vs Cycle	FDA	%	Test Summary (Imperial Units)	FAT_IMPSUM_STRAIN_MEAN_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
Strain Amplitude vs Cycle	FDA	%	Test Summary (Imperial Units)	FAT_IMPSUM_STRAIN_AMP_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
Stress R-ratio vs Cycle	FDA		Test Summary (Imperial Units)	FAT_IMPSUM_STRESS_RRATIO_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
Stress A-ratio vs Cycle	FDA		Test Summary (Imperial Units)	FAT_IMPSUM_STRESS_ARATIO_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
Stress V-ratio vs Cycle	FDA		Test Summary (Imperial Units)	FAT_IMPSUM_STRESS_VRATIO_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
Strain R-ratio vs Cycle	FDA		Test Summary (Imperial Units)	FAT_IMPSUM_STRAIN_RRATIO_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
Strain A-ratio vs Cycle	FDA		Test Summary (Imperial Units)	FAT_IMPSUM_STRAIN_ARATIO_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
Strain V-ratio vs Cycle	FDA		Test Summary (Imperial Units)	FAT_IMPSUM_STRAIN_VRATIO_EXPORT	FAT_IMPSUM_CYCLES_EXPORT

TABLE A.11.—GENERIC CYCLIC TEST SUMMARY ATTRIBUTE SPECIFICATION

Database attribute name	Database data type[a]	Default units	Source data worksheet[b]	Source data worksheet, data range name	Source data worksheet, parameter range name(s)[c]
Stress Range vs Cycle	FDA	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_STRESS_RANGE_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
Cyclic Test Data Tensile/Compression Stage Summary	TABL		Test Summary (Imperial Units)	FAT_IMPSUM_L_CYCSTAGENUM_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
					FAT_IMPSUM_STRESS_MAX_EXPORT
					FAT_IMPSUM_STRAIN_MAX_EXPORT
					FAT_IMPSUM_STRESS_MIN_EXPORT
					FAT_IMPSUM_STRAIN_MIN_EXPORT
					FAT_IMPSUM_STRESS_MEAN_EXPORT
					FAT_IMPSUM_STRESS_RANGE_EXPORT
					FAT_IMPSUM_STRESS_AMP_EXPORT
					FAT_IMPSUM_STRESS_RRATIO_EXPORT
					FAT_IMPSUM_STRESS_ARATIO_EXPORT
					FAT_IMPSUM_STRESS_VRATIO_EXPORT
					FAT_IMPSUM_STRAIN_MEAN_EXPORT
					FAT_IMPSUM_STRAIN_AMP_EXPORT
					FAT_IMPSUM_STRAIN_RRATIO_EXPORT
					FAT_IMPSUM_STRAIN_ARATIO_EXPORT
					FAT_IMPSUM_STRAIN_VRATIO_EXPORT
					FAT_IMPSUM_TSR_EXPORT
					FAT_IMPSUM_ESR_EXPORT
					FAT_IMPSUM_PSR_EXPORT
Cyclic Tensile Load/Compression Unload Elastic Properties	TABL		Test Summary (Imperial Units)	FAT_IMPSUM_L_CYCSTAGENUM_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
					FAT_IMPSUM_L_CYCSTAGENUM_EXPORT
					FAT_IMPSUM_L_MOD_EXPORT
					FAT_IMPSUM_L_PR12_EXPORT
					FAT_IMPSUM_L_PR13_EXPORT
					FAT_IMPSUM_L_PR23_EXPORT
					FAT_IMPSUM_L_PYIELD_EXPORT
					FAT_IMPSUM_L_OFFSET1_EXPORT
					FAT_IMPSUM_L_OFFSET2_EXPORT
					FAT_IMPSUM_L_OFFSET3_EXPORT
Cyclic Tensile Unload/Compression Load Elastic Properties	TABL		Test Summary (Imperial Units)	FAT_IMPSUM_UL_CYCSTAGENUM_EXPORT	FAT_IMPSUM_CYCLES_EXPORT
					FAT_IMPSUM_UL_CYCSTAGENUM_EXPORT

TABLE A.11.—GENERIC CYCLIC TEST SUMMARY ATTRIBUTE SPECIFICATION

Database attribute name	Database data type[a]	Default units	Source data worksheet[b]	Source data worksheet, data range name	Source data worksheet, parameter range name(s)[c]
					FAT_IMPSUM_UL_MOD_EXPORT
					FAT_IMPSUM_UL_PR12_EXPORT
					FAT_IMPSUM_UL_PR13_EXPORT
					FAT_IMPSUM_UL_PR23_EXPORT
					FAT_IMPSUM_UL_PYIELD_EXPORT
					FAT_IMPSUM_UL_OFFSET1_EXPORT
					FAT_IMPSUM_UL_OFFSET2_EXPORT
					FAT_IMPSUM_UL_OFFSET3_EXPORT
Generic Cyclic Relaxation Stage Summary	TABL		Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_CYCSTAGENUM_EXPORT	FAT_IMPSUM_RELAX_CI_EXPORT
					FAT_IMPSUM_RELAX_CYCLE_EXPORT
					FAT_IMPSUM_RELAX_STAGENUM_EXPORT
					FAT_IMPSUM_RELAX_CONTROLMODE_EXPORT
					FAT_IMPSUM_RELAX_TESTTEMP_EXPORT
					FAT_IMPSUM_RELAX_TESTSTRAIN11_EXPORT
					FAT_IMPSUM_RELAX_TESTSTRAIN22_EXPORT
					FAT_IMPSUM_RELAX_TESTSTRAIN33_EXPORT
					FAT_IMPSUM_RELAX_TESTSTRAIN12_EXPORT
					FAT_IMPSUM_RELAX_STARTTIME_EXPORT
					FAT_IMPSUM_RELAX_ENDTIME_EXPORT
					FAT_IMPSUM_RELAX_PL_STARTLOAD11_EXPORT
					FAT_IMPSUM_RELAX_PUL_STARTLOAD11_EXPORT
					FAT_IMPSUM_RELAX_PL_ENDLOAD11_EXPORT
					FAT_IMPSUM_RELAX_PUL_ENDLOAD11_EXPORT
					FAT_IMPSUM_RELAX_PL_STARTLOAD22_EXPORT
					FAT_IMPSUM_RELAX_PUL_STARTLOAD22_EXPORT
					FAT_IMPSUM_RELAX_PL_ENDLOAD22_EXPORT
					FAT_IMPSUM_RELAX_PUL_ENDLOAD22_EXPORT
					FAT_IMPSUM_RELAX_PL_STARTLOAD12_EXPORT
					FAT_IMPSUM_RELAX_PUL_STARTLOAD12_EXPORT
					FAT_IMPSUM_RELAX_PL_ENDLOAD12_EXPORT
					FAT_IMPSUM_RELAX_PUL_ENDLOAD12_EXPORT
Control Mode	DCT		Test Summary (Imperial Units)	FAT_CONTROLMODE	

TABLE A.11.—GENERIC CYCLIC TEST SUMMARY ATTRIBUTE SPECIFICATION

Database attribute name	Database data type[a]	Default units	Source data worksheet[b]	Source data worksheet, data range name	Source data worksheet, parameter range name(s)[c]
Cyclic Frequency	PNT	Hz	Test Summary (Imperial Units)	FAT_FREQ	
Target R-Ratio	PNT		Test Summary (Imperial Units)	FAT_TARGETR	
Total Strain Range	PNT	%	Test Summary (Imperial Units)	FAT_STRAINRANGE	
Total Stress Range	PNT	ksi	Test Summary (Imperial Units)	FAT_STRESSRANGE	
Maximum Stress	PNT	ksi	Test Summary (Imperial Units)	FAT_MAXSTRESS	
KT	PNT		Test Summary (Imperial Units)	FAT_KT	
Test Temperature, Absolute	PNT	°R	Test Summary (Imperial Units)	FAT_TESTTEMP_ABS	
Cyclic Life	PNT	cycles	Test Summary (Imperial Units)	FAT_CYCLIFE	
Half-life Cycle	PNT	cycles	Hidden Data	GENERIC_CYCHALF	
Fatigue Failure	DCT		Hidden Data	GENERIC_FAILUREMODE	
Total Strain Range at Half-life	PNT	%	Test Summary (Imperial Units)	FAT_HALF_TSR	
Elastic Strain Range at Half-life	PNT	%	Test Summary (Imperial Units)	FAT_HALF_ESR	
Plastic Strain Range at Half-life	PNT	%	Test Summary (Imperial Units)	FAT_HALF_PSR	
Total Stress Range at Half-life	PNT	ksi	Test Summary (Imperial Units)	FAT_HALF_STRESS_RANGE	
Maximum Stress at Half-life	PNT	ksi	Test Summary (Imperial Units)	FAT_HALF_STRESS_MAX	
Young 's Modulus at Half-life	PNT	msi	Test Summary (Imperial Units)	FAT_HALF_MODULUS	
Cycle Stage Summary	TABL		Hidden Data	GENERIC_CYCLE_SUM_CYCSTAGENUM	GENERIC_CYCLE_SUM_BLOCKNUM
					GENERIC_CYCLE_SUM_CI
					GENERIC_CYCLE_SUM_STAGENUM
					GENERIC_CYCLE_SUM_CYCSTAGENUM
					GENERIC_CYCLE_SUM_STAGETYPE
Cycle Summary	TABL		Hidden Data	GENERIC_CYCLE_NUM	GENERIC_CYCLE_NUM
					GENERIC_CYCLE_NAME
Generic Cyclic Creep Stage Summary	TABL		Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_CYCSTAGENUM_EXPORT	FAT_IMPSUM_CREEP_CI_EXPORT
					FAT_IMPSUM_CREEP_CYCLE_EXPORT
					FAT_IMPSUM_CREEP_STAGENUM_EXPORT
					FAT_IMPSUM_CREEP_CONTROLMODE_EXPORT
					FAT_IMPSUM_CREEP_TESTLOAD_EXPORT
					FAT_IMPSUM_CREEP_STRAIN1_PC_EXPORT
					FAT_IMPSUM_CREEP_PL_STRAIN1_TIME_EXPORT
					FAT_IMPSUM_CREEP_PUL_STRAIN1_TIME_EXPORT
					FAT_IMPSUM_CREEP_STRAIN2_PC_EXPORT

TABLE A.11.—GENERIC CYCLIC TEST SUMMARY ATTRIBUTE SPECIFICATION

Database attribute name	Database data type[a]	Default units	Source data worksheet[b]	Source data worksheet, data range name	Source data worksheet, parameter range name(s)[c]
					FAT_IMPSUM_CREEP_PL_STRAIN2_TIME_EXPORT
					FAT_IMPSUM_CREEP_PUL_STRAIN2_TIME_EXPORT
					FAT_IMPSUM_CREEP_FAIL_TIME_EXPORT
					FAT_IMPSUM_CREEP_FAIL_STRAIN_EXPORT
Generic Cyclic Creep Zone Summary	TABL		Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_CYCSTAGENUM_EXPORT	FAT_IMPSUM_CREEP_CI_EXPORT
					FAT_IMPSUM_CREEP_CYCLE_EXPORT
					FAT_IMPSUM_CREEP_STAGENUM_EXPORT
					FAT_IMPSUM_CREEP_PRIM_STARTTIME_EXPORT
					FAT_IMPSUM_CREEP_PRIM_ENDTIME_EXPORT
					FAT_IMPSUM_CREEP_PRIM_PL_STRAINRATE_EXPORT
					FAT_IMPSUM_CREEP_PRIM_PUL_STRAINRATE_EXPORT
					FAT_IMPSUM_CREEP_SEC_STARTTIME_EXPORT
					FAT_IMPSUM_CREEP_SEC_ENDTIME_EXPORT
					FAT_IMPSUM_CREEP_SEC_PL_STRAINRATE_EXPORT
					FAT_IMPSUM_CREEP_SEC_PUL_STRAINRATE_EXPORT
					FAT_IMPSUM_CREEP_SEC_PL_R2_EXPORT
					FAT_IMPSUM_CREEP_SEC_PUL_R2_EXPORT
					FAT_IMPSUM_CREEP_TERT_STARTTIME_EXPORT
					FAT_IMPSUM_CREEP_TERT_ENDTIME_EXPORT
					FAT_IMPSUM_CREEP_TERT_PL_STRAINRATE_EXPORT
					FAT_IMPSUM_CREEP_TERT_PUL_STRAINRATE_EXPORT

[a]See Reference 5 for information on data types.

[b][y] = Sequential worksheet number, from one to five, with 20 cycles of data displayed on each of five worksheets, for a total maximum number of cycles of 100.

[c]For database attributes with a data type of FDA, whose range names begin with the “CES_EXPORT_” prefix, the range name listed in this table will often represent the range name base for multiple named ranges on the corresponding source data worksheet, with the full range name consisting of the range name as listed in the table, plus a sequential suffix of the form “_01”, “_02”, “_03,” etc. This enables the associated data to be plotted on a single plot when uploaded to the database, with the plot identified by a single attribute name, and the individual series on the plot distinguished by the No. of Cycles parameter value. See Table A.12 and Table A.13 for additional information.

TABLE A.12.—GENERIC CYCLIC TEST SUMMARY ATTRIBUTE PARAMETER SPECIFICATION

Database parameter name	Default units	Source data worksheet[a]	Source data worksheet, parameter range name[b]
Strain 11	%	Cycle Data 1	CES_EXPORT_TENSILE_STRAIN1
Strain 22	%	Cycle Data 1	CES_EXPORT_TENSILE_STRAIN2
Time	s	Cycle Data 1	CES_EXPORT_TENSILE_TIME
Strain 11	%	Cycle Data [y]	CES_EXPORT_STRAIN1
No. of Cycles		Cycle Data [y]	CES_EXPORT_CYCLE
Time	s	Cycle Data [y]	CES_EXPORT_TIME
Strain 22	%	Cycle Data [y]	CES_EXPORT_STRAIN2
No. of Cycles		Test Summary (Imperial Units)	FAT_IMPSUM_CYCLES_EXPORT
Maximum Stress	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_STRESS_MAX_EXPORT
Maximum Strain	%	Test Summary (Imperial Units)	FAT_IMPSUM_STRAIN_MAX_EXPORT
Minimum Stress	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_STRESS_MIN_EXPORT
Minimum Strain	%	Test Summary (Imperial Units)	FAT_IMPSUM_STRAIN_MIN_EXPORT
Mean Stress	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_STRESS_MEAN_EXPORT
Stress Range	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_STRESS_RANGE_EXPORT
Stress Amplitude	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_STRESS_AMP_EXPORT
Stress R-Ratio		Test Summary (Imperial Units)	FAT_IMPSUM_STRESS_RRATIO_EXPORT
Stress A-Ratio		Test Summary (Imperial Units)	FAT_IMPSUM_STRESS_ARATIO_EXPORT
Stress V-Ratio		Test Summary (Imperial Units)	FAT_IMPSUM_STRESS_VRATIO_EXPORT
Mean Strain	%	Test Summary (Imperial Units)	FAT_IMPSUM_STRAIN_MEAN_EXPORT
Strain Amplitude	%	Test Summary (Imperial Units)	FAT_IMPSUM_STRAIN_AMP_EXPORT
Strain R-Ratio		Test Summary (Imperial Units)	FAT_IMPSUM_STRAIN_RRATIO_EXPORT
Strain A-Ratio		Test Summary (Imperial Units)	FAT_IMPSUM_STRAIN_ARATIO_EXPORT
Strain V-Ratio		Test Summary (Imperial Units)	FAT_IMPSUM_STRAIN_VRATIO_EXPORT
Total Strain Range	%	Test Summary (Imperial Units)	FAT_IMPSUM_TSR_EXPORT
Elastic Strain Range	%	Test Summary (Imperial Units)	FAT_IMPSUM_ESR_EXPORT
Plastic Strain Range	%	Test Summary (Imperial Units)	FAT_IMPSUM_PSR_EXPORT
Cumulative Stage Number		Test Summary (Imperial Units)	FAT_IMPSUM_L_CYCSTAGENUM_EXPORT
Young's Modulus (11-axis)	msi	Test Summary (Imperial Units)	FAT_IMPSUM_L_MOD_EXPORT
Elastic Poisson's Ratio (12-plane)		Test Summary (Imperial Units)	FAT_IMPSUM_L_PR12_EXPORT

TABLE A.12.—GENERIC CYCLIC TEST SUMMARY ATTRIBUTE PARAMETER SPECIFICATION

Database parameter name	Default units	Source data worksheet[a]	Source data worksheet, parameter range name[b]
Elastic Poisson's Ratio (13-plane)		Test Summary (Imperial Units)	FAT_IMPSUM_L_PR13_EXPORT
Elastic Poisson's Ratio (23-plane)		Test Summary (Imperial Units)	FAT_IMPSUM_L_PR23_EXPORT
Proportional Limit	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_L_PYIELD_EXPORT
0.02% Offset Yield Stress	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_L_OFFSET1_EXPORT
0.2% Offset Yield Stress	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_L_OFFSET2_EXPORT
User Defined Offset Yield Stress	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_L_OFFSET3_EXPORT
Cumulative Stage Number		Test Summary (Imperial Units)	FAT_IMPSUM_UL_CYCSTAGENUM_EXPORT
Young's Modulus (11-axis)	msi	Test Summary (Imperial Units)	FAT_IMPSUM_UL_MOD_EXPORT
Elastic Poisson's Ratio (12-plane)		Test Summary (Imperial Units)	FAT_IMPSUM_UL_PR12_EXPORT
Elastic Poisson's Ratio (13-plane)		Test Summary (Imperial Units)	FAT_IMPSUM_UL_PR13_EXPORT
Elastic Poisson's Ratio (23-plane)		Test Summary (Imperial Units)	FAT_IMPSUM_UL_PR23_EXPORT
Proportional Limit	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_UL_PYIELD_EXPORT
0.02% Offset Yield Stress	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_UL_OFFSET1_EXPORT
0.2% Offset Yield Stress	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_UL_OFFSET2_EXPORT
User Defined Offset Yield Stress	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_UL_OFFSET3_EXPORT
Cycle Index		Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_CI_EXPORT
No. of Cycles		Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_CYCLE_EXPORT
Stage Number		Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_STAGENUM_EXPORT
Control Mode		Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_CONTROLMODE_EXPORT
Test Temperature	°F	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_TESTTEMP_EXPORT
Test Strain 11	%	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_TESTSTRAIN11_EXPORT
Test Strain 22	%	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_TESTSTRAIN22_EXPORT
Test Strain 33	%	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_TESTSTRAIN33_EXPORT
Test Strain 12	%	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_TESTSTRAIN12_EXPORT
Constant Strain Zone Start Time	s	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_STARTTIME_EXPORT
Constant Strain Zone End Time	s	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_ENDTIME_EXPORT
Initial Stress, Post-Load Stage (11-axis)	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_PL_STARTLOAD11_EXPORT
Initial Stress, Post-Unload Stage (11-axis)	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_PUL_STARTLOAD11_EXPORT
Final Stress, Post-Load Stage (11-axis)	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_PL_ENDLOAD11_EXPORT

TABLE A.12.—GENERIC CYCLIC TEST SUMMARY ATTRIBUTE PARAMETER SPECIFICATION

Database parameter name	Default units	Source data worksheet[a]	Source data worksheet, parameter range name[b]
Final Stress, Post-Unload Stage (11-axis)	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_PUL_ENDLOAD11_EXPORT
Initial Stress, Post-Load Stage (22-axis)	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_PL_STARTLOAD22_EXPORT
Initial Stress, Post-Unload Stage (22-axis)	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_PUL_STARTLOAD22_EXPORT
Final Stress, Post-Load Stage (22-axis)	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_PL_ENDLOAD22_EXPORT
Final Stress, Post-Unload Stage (22-axis)	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_PUL_ENDLOAD22_EXPORT
Initial Stress, Post-Load Stage (12-plane)	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_PL_STARTLOAD12_EXPORT
Initial Stress, Post-Unload Stage (12-plane)	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_PUL_STARTLOAD12_EXPORT
Final Stress, Post-Load Stage (12-plane)	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_PL_ENDLOAD12_EXPORT
Final Stress, Post-Unload Stage (12-plane)	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_RELAX_PUL_ENDLOAD12_EXPORT
Block Number		Hidden Data	GENERIC_CYCLE_SUM_BLOCKNUM
Cycle Index		Hidden Data	GENERIC_CYCLE_SUM_CI
No. of Cycles		Hidden Data	GENERIC_CYCLE_SUM_CYCLENUM
Stage Number		Hidden Data	GENERIC_CYCLE_SUM_STAGENUM
Cumulative Stage Number		Hidden Data	GENERIC_CYCLE_SUM_CYCSTAGENUM
Stage Type		Hidden Data	GENERIC_CYCLE_SUM_STAGETYPE
Cycle Index		Hidden Data	GENERIC_CYCLE_NUM
No. of Cycles		Hidden Data	GENERIC_CYCLE_NAME
Strain 11	%	Hidden Data	CES_EXPORT_TENSILE_STRAIN1
Test Load	ksi	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_TESTLOAD_EXPORT
% Creep Strain 1	%	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_STRAIN1_PC_EXPORT
Time to Strain 1, Post-Load Stage	s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_PL_STRAIN1_TIME_EXPORT
Time to Strain 1, Post-Unload Stage	s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_PUL_STRAIN1_TIME_EXPORT
% Creep Strain 2	%	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_STRAIN2_PC_EXPORT
Time to Strain 2, Post-Load Stage	s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_PL_STRAIN2_TIME_EXPORT
Time to Strain 2, Post-Unload Stage	s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_PUL_STRAIN2_TIME_EXPORT
Elapsed Time, Failure Point	s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_FAIL_TIME_EXPORT
Creep Strain at Failure	%	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_FAIL_STRAIN_EXPORT
Primary Strain Response Zone Start Time	s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_PRIM_STARTTIME_EXPORT
Primary Strain Response Zone End Time	s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_PRIM_ENDTIME_EXPORT

TABLE A.12.—GENERIC CYCLIC TEST SUMMARY ATTRIBUTE PARAMETER SPECIFICATION

Database parameter name	Default units	Source data worksheet[a]	Source data worksheet, parameter range name[b]
Strain Rate, Post-Load Stage, Primary SR Zone	%/s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_PRIM_PL_STRAINRATE_EXPORT
Strain Rate, Post-Unload Stage, Primary SR Zone	%/s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_PRIM_PUL_STRAINRATE_EXPORT
Secondary Strain Response Zone Start Time	s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_SEC_STARTTIME_EXPORT
Secondary Strain Response Zone End Time	s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_SEC_ENDTIME_EXPORT
Strain Rate, Post-Load Stage, Secondary SR Zone	%/s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_SEC_PL_STRAINRATE_EXPORT
Strain Rate, Post-Unload Stage, Secondary SR Zone	%/s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_SEC_PUL_STRAINRATE_EXPORT
R-squared, Post-Load Stage, Secondary SR Zone		Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_SEC_PL_R2_EXPORT
R-squared, Post-Unload Stage, Secondary SR Zone		Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_SEC_PUL_R2_EXPORT
Tertiary Strain Response Zone Start Time	s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_TERT_STARTTIME_EXPORT
Tertiary Strain Response Zone End Time	s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_TERT_ENDTIME_EXPORT
Strain Rate, Post-Load Stage, Tertiary SR Zone	%/s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_TERT_PL_STRAINRATE_EXPORT
Strain Rate, Post-Unload Stage, Tertiary SR Zone	%/s	Test Summary (Imperial Units)	FAT_IMPSUM_CREEP_TERT_PUL_STRAINRATE_EXPORT

[a][y] = Sequential worksheet number, from 1 to 5, with 20 cycles of data displayed on each of five worksheets, for a total maximum number of cycles of 100.

[b]For parameters whose corresponding attribute's data type is FDA, whose range names begin with the "CES_EXPORT_" prefix, the range name listed in this table will often represent the range name base for multiple named ranges on the corresponding source data worksheet, with the full range name consisting of the range name as listed in the table, plus a sequential suffix of the form "_01", "_02", "_03," etc. This enables the associated values to be plotted on a single plot when uploaded to the database, with the plot identified by a single attribute name, and the individual series on the plot distinguished by the No. of Cycles parameter value. See Table A.13 for additional information.

TABLE A.13.—GENERIC CYCLIC TEST SUMMARY FUNCTIONAL DATA SERIES SPECIFICATION

Database attribute name	Source data worksheet[a]	Source data worksheet, Series ID range name root[b]	Series ID range name suffix[b]	Series ID value[b]
Hysteresis Loops (11-axis)	Cycle Data [y]	CES_EXPORT_CYCLE	For each of up to a maximum of 20 series on the Source Data Worksheet, and up to a maximum of 5 distinct Source Data Worksheets, the suffix will consist of a two-digit sequential value, ranging from "01" to "20," preceded by the "_" character, i.e., "_01" through "_20"	*No. of Cycles* value associated with the individual series (i.e., cycle number value associated with the series data in the raw source data file from which the test data was imported)
Cyclic Stress (11-axis) vs Time	Cycle Data [y]	CES_EXPORT_CYCLE	For each of up to a maximum of 20 series on the Source Data Worksheet, and up to a maximum of 5 distinct Source Data Worksheets, the suffix will consist of a two-digit sequential value, ranging from "01" to "20," preceded by the "_" character, i.e., "_01" through "_20"	*No. of Cycles* value associated with the individual series (i.e., cycle number value associated with the series data in the raw source data file from which the test data was imported)
Cyclic Strain (11-axis) vs Time	Cycle Data [y]	CES_EXPORT_CYCLE	For each of up to a maximum of 20 series on the Source Data Worksheet, and up to a maximum of 5 distinct Source Data Worksheets, the suffix will consist of a two-digit sequential value, ranging from "01" to "20," preceded by the "_" character, i.e., "_01" through "_20"	*No. of Cycles* value associated with the individual series (i.e., cycle number value associated with the series data in the raw source data file from which the test data was imported)
Hysteresis Loops (22-axis)	Cycle Data [y]	CES_EXPORT_CYCLE	For each of up to a maximum of 20 series on the Source Data Worksheet, and up to a maximum of 5 distinct Source Data Worksheets, the suffix will consist of a two-digit sequential value, ranging from "01" to "20," preceded by the "_" character, i.e., "_01" through "_20"	*No. of Cycles* value associated with the individual series (i.e., cycle number value associated with the series data in the raw source data file from which the test data was imported)
Cyclic Strain (22-axis) vs Time	Cycle Data [y]	CES_EXPORT_CYCLE	For each of up to a maximum of 20 series on the Source Data Worksheet, and up to a maximum of 5 distinct Source Data Worksheets, the suffix will consist of a two-digit sequential value, ranging from "01" to "20," preceded by the "_" character, i.e., "_01" through "_20"	*No. of Cycles* value associated with the individual series (i.e., cycle number value associated with the series data in the raw source data file from which the test data was imported)

[a][y] = Sequential worksheet number from 1 to 5.

[b]Series ID refers to the series identification.

TABLE A.14.—GENERIC CYCLIC POSTPROCESSING UTILITY STAGE-BASED SUMMARY ATTRIBUTES SPECIFICATION

[Attributes listed in this table are generated via the "Create Stage-Based Test Summary Attributes" command button on the Test Summary (Imperial Units) or Test Summary (Metric Units) worksheet.]

Database attribute name	Database data type[a]	Default units	Source data worksheet	Source data worksheet, data range name[b]	Source data worksheet, parameter range name(s)
ESR vs Cycle	FDA	%	TC Summary Data	PPC_TC_ESR_HIST	PPC_TC_CYCLE_HIST
					PPC_TC_ESR_SID
					PPC_TC_LDSTAGE_HIST
					PPC_TC_ULSTAGE_HIST
PSR vs Cycle	FDA	%	TC Summary Data	PPC_TC_PSR_HIST	PPC_TC_CYCLE_HIST
					PPC_TC_PSR_SID
					PPC_TC_LDSTAGE_HIST
					PPC_TC_ULSTAGE_HIST
Elastic Modulus vs Cycle	FDA	msi	TC Summary Data	PPC_TC_EMOD_HIST	PPC_TC_CYCLE_HIST
					PPC_TC_SID
					PPC_TC_STAGE_HIST
Poisson's Ratio, 12-Plane vs Cycle	FDA		TC Summary Data	PPC_TC_PR12_HIST	PPC_TC_CYCLE_HIST
					PPC_TC_SID
					PPC_TC_STAGE_HIST
Poisson's Ratio, 13-Plane vs Cycle	FDA		TC Summary Data	PPC_TC_PR13_HIST	PPC_TC_CYCLE_HIST
					PPC_TC_SID
					PPC_TC_STAGE_HIST
Poisson's Ratio, 23-Plane vs Cycle	FDA		TC Summary Data	PPC_TC_PR23_HIST	PPC_TC_CYCLE_HIST
					PPC_TC_SID
					PPC_TC_STAGE_HIST
Yield Stress, Proportional vs Cycle	FDA	ksi	TC Summary Data	PPC_TC_PYLD_HIST	PPC_TC_CYCLE_HIST
					PPC_TC_SID
					PPC_TC_STAGE_HIST
Yield Stress, 0.02% vs Cycle	FDA	ksi	TC Summary Data	PPC_TC_O1YLD_HIST	PPC_TC_CYCLE_HIST
					PPC_TC_SID
					PPC_TC_STAGE_HIST
Yield Stress, 0.2% vs Cycle	FDA	ksi	TC Summary Data	PPC_TC_O2YLD_HIST	PPC_TC_CYCLE_HIST

TABLE A.14.—GENERIC CYCLIC POSTPROCESSING UTILITY STAGE-BASED SUMMARY ATTRIBUTES SPECIFICATION

[Attributes listed in this table are generated via the "Create Stage-Based Test Summary Attributes" command button on the Test Summary (Imperial Units) or Test Summary (Metric Units) worksheet.]

Database attribute name	Database data type[a]	Default units	Source data worksheet	Source data worksheet, data range name[b]	Source data worksheet, parameter range name(s)
					PPC_TC_SID
					PPC_TC_STAGE_HIST
Yield Stress, User-Defined % vs Cycle	FDA	ksi	TC Summary Data	PPC_TC_UDYLD_HIST	PPC_TC_CYCLE_HIST
					PPC_TC_SID
					PPC_TC_STAGE_HIST
Primary Response Zone Strain Rate vs Cycle	FDA	%/s	Creep Summary Data	PPC_CRP_PRIMSR_HIST	PPC_CRP_CYCLE_HIST
					PPC_CRP_SID
					PPC_CRP_STAGE_HIST
Secondary Response Zone Strain Rate vs Cycle	FDA	%/s	Creep Summary Data	PPC_CRP_SECSR_HIST	PPC_CRP_CYCLE_HIST
					PPC_CRP_SID
					PPC_CRP_STAGE_HIST
Tertiary Response Zone Strain Rate vs Cycle	FDA	%/s	Creep Summary Data	PPC_CRP_TERTSR_HIST	PPC_CRP_CYCLE_HIST
					PPC_CRP_SID
					PPC_CRP_STAGE_HIST
Time to Strain 1 vs Cycle	FDA	s	Creep Summary Data	PPC_CRP_TTS1_HIST	PPC_CRP_CYCLE_HIST
					PPC_CRP_SID
					PPC_CRP_STAGE_HIST
Time to Strain 2 vs Cycle	FDA	s	Creep Summary Data	PPC_CRP_TTS2_HIST	PPC_CRP_CYCLE_HIST
					PPC_CRP_SID
					PPC_CRP_STAGE_HIST
Creep Stage R^2 vs Cycle	FDA		Creep Summary Data	PPC_CRP_RSQUARED_HIST	PPC_CRP_CYCLE_HIST
					PPC_CRP_SID
					PPC_CRP_STAGE_HIST
Initial Stress, 11-Axis vs Cycle	FDA	ksi	Relaxation Summary Data	PPC_RLX_INITSTRESS11_HIST	PPC_RLX_CYCLE_HIST
					PPC_RLX_SID
					PPC_RLX_STAGE_HIST
Initial Stress, 22-Axis vs Cycle	FDA	ksi	Relaxation Summary Data	PPC_RLX_INITSTRESS22_HIST	PPC_RLX_CYCLE_HIST

TABLE A.14.—GENERIC CYCLIC POSTPROCESSING UTILITY STAGE-BASED SUMMARY ATTRIBUTES SPECIFICATION
[Attributes listed in this table are generated via the "Create Stage-Based Test Summary Attributes" command button on the Test Summary (Imperial Units) or Test Summary (Metric Units) worksheet.]

Database attribute name	Database data type[a]	Default units	Source data worksheet	Source data worksheet, data range name[b]	Source data worksheet, parameter range name(s)
					PPC_RLX_SID
					PPC_RLX_STAGE_HIST
Initial Stress, 12-Axis vs Cycle	FDA	ksi	Relaxation Summary Data	PPC_RLX_INITSTRESS12_HIST	PPC_RLX_CYCLE_HIST
					PPC_RLX_SID
					PPC_RLX_STAGE_HIST
Final Stress, 11-Axis vs Cycle	FDA	ksi	Relaxation Summary Data	PPC_RLX_FINALSTRESS11_HIST	PPC_RLX_CYCLE_HIST
					PPC_RLX_SID
					PPC_RLX_STAGE_HIST
Final Stress, 22-Axis vs Cycle	FDA	ksi	Relaxation Summary Data	PPC_RLX_FINALSTRESS22_HIST	PPC_RLX_CYCLE_HIST
					PPC_RLX_SID
					PPC_RLX_STAGE_HIST
Final Stress, 12-Axis vs Cycle	FDA	ksi	Relaxation Summary Data	PPC_RLX_FINALSTRESS12_HIST	PPC_RLX_CYCLE_HIST
					PPC_RLX_SID
					PPC_RLX_STAGE_HIST

[a]See Reference 5 for information on data types.

[b]For database attributes listed in this table, the range name listed in the table will often represent the range name base for multiple named ranges on the corresponding source data worksheet, with the full range name consisting of the range name as listed in the table, plus a sequential suffix of the form "_01", "_02", "_03," etc. This enables the associated data to be plotted on a single plot when uploaded to the database, with the plot identified by a single attribute name, and the individual series on the plot distinguished by the Series ID parameter value.

TABLE A.15.—GENERIC CYCLIC POSTPROCESSING UTILITY STAGE-BASED SUMMARY ATTRIBUTE PARAMETER SPECIFICATION

[Parameters listed in this table are generated via the "Create Stage-Based Test Summary Attributes" command button on the Test Summary (Imperial Units) or Test Summary (Metric Units) worksheet.]

Database parameter name	Default units	Source data worksheet	Source data worksheet, parameter range name[a]
No. of Cycles		TC Summary Data	PPC_TC_CYCLE_HIST
Series ID		TC Summary Data	PPC_TC_ESR_SID
Series ID		TC Summary Data	PPC_TC_PSR_SID
Series ID		TC Summary Data	PPC_TC_SID
Load Stage Number		TC Summary Data	PPC_TC_LDSTAGE_HIST
Unload Stage Number		TC Summary Data	PPC_TC_ULSTAGE_HIST
Stage Number		TC Summary Data	PPC_TC_STAGE_HIST
No. of Cycles		Creep Summary Data	PPC_CRP_CYCLE_HIST
Series ID		Creep Summary Data	PPC_CRP_SID
Stage Number		Creep Summary Data	PPC_CRP_STAGE_HIST
No. of Cycles		Relaxation Summary Data	PPC_RLX_CYCLE_HIST
Series ID		Relaxation Summary Data	PPC_RLX_SID
Stage Number		Relaxation Summary Data	PPC_RLX_STAGE_HIST

[a]For Parameters listed in this table, the Range Name listed in the table will often represent the range name base for multiple named ranges on the corresponding Source Data Worksheet, with the full range name consisting of the Range Name as listed in the table, plus a sequential suffix of the form "_01", "_02", "_03," etc. This enables the associated values to be plotted on a single plot when uploaded to the database, with the plot identified by a single attribute name, and the individual series on the plot distinguished by the Series ID parameter value.

TABLE A.16.—GENERIC CYCLIC POSTPROCESSING UTILITY STAGE-BASED ATTRIBUTES FUNCTIONAL DATA SERIES SPECIFICATION

Database attribute name	Source data worksheet	Source data worksheet, Series ID range name root[b]	Series ID range name suffix[b]	Series ID value[b]
ESR vs Cycle	TC Summary Data	PPC_TC_ESR_SID	_01[a]	Elastic Strain Range
PSR vs Cycle	TC Summary Data	PPC_TC_PSR_SID	_01[a]	Plastic Strain Range
Elastic Modulus vs Cycle	TC Summary Data	PPC_TC_SID	_01, _02, etc., i.e., a 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of tensile and/or compression stages included in any cycle of the test	Tensile Loading Stage, Compression Unloading Stage, Tensile Unloading Stage, or Compression Loading Stage
Poisson's Ratio, 12-Plane vs Cycle	TC Summary Data	PPC_TC_SID	_01, _02, etc., i.e., a 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of tensile and/or compression stages included in any cycle of the test	Tensile Loading Stage, Compression Unloading Stage, Tensile Unloading Stage, or Compression Loading Stage
Poisson's Ratio, 13-Plane vs Cycle	TC Summary Data	PPC_TC_SID	_01, _02, etc., i.e., a 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of tensile and/or compression stages included in any cycle of the test	Tensile Loading Stage, Compression Unloading Stage, Tensile Unloading Stage, or Compression Loading Stage
Poisson's Ratio, 23-Plane vs Cycle	TC Summary Data	PPC_TC_SID	_01, _02, etc., i.e., a 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of tensile and/or compression stages included in any cycle of the test	Tensile Loading Stage, Compression Unloading Stage, Tensile Unloading Stage, or Compression Loading Stage
Yield Stress, Proportional vs Cycle	TC Summary Data	PPC_TC_SID	_01, _02, etc., i.e., a 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of tensile and/or compression stages included in any cycle of the test	Tensile Loading Stage, Compression Unloading Stage, Tensile Unloading Stage, or Compression Loading Stage
Yield Stress, 0.02% vs Cycle	TC Summary Data	PPC_TC_SID	_01, _02, etc., i.e., a 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of tensile and/or compression stages included in any cycle of the test	Tensile Loading Stage, Compression Unloading Stage, Tensile Unloading Stage, or Compression Loading Stage
Yield Stress, 0.2% vs Cycle	TC Summary Data	PPC_TC_SID	_01, _02, etc., i.e., a 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of tensile and/or compression stages included in any cycle of the test	Tensile Loading Stage, Compression Unloading Stage, Tensile Unloading Stage, *or* Compression Loading Stage
Yield Stress, User-Defined % vs Cycle	TC Summary Data	PPC_TC_SID	_01, _02, etc., i.e., a 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of tensile and/or compression stages included in any cycle of the test	Tensile Loading Stage, Compression Unloading Stage, Tensile Unloading Stage, *or* Compression Loading Stage

TABLE A.16.—GENERIC CYCLIC POSTPROCESSING UTILITY STAGE-BASED ATTRIBUTES FUNCTIONAL DATA SERIES SPECIFICATION

Database attribute name	Source data worksheet	Source data worksheet, Series ID range name root[b]	Series ID range name suffix[b]	Series ID value[b]
Primary Response Zone Strain Rate vs Cycle	Creep Summary Data	PPC_CRP_SID	_01, _02, etc., i.e., 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of creep stages included in any cycle of the test	Post-Load Stage *or* Post-Unload Stage
Secondary Response Zone Strain Rate vs Cycle	Creep Summary Data	PPC_CRP_SID	_01, _02, etc., i.e., 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of creep stages included in any cycle of the test	Post-Load Stage *or* Post-Unload Stage
Tertiary Response Zone Strain Rate vs Cycle	Creep Summary Data	PPC_CRP_SID	_01, _02, etc., i.e., 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of creep stages included in any cycle of the test	Post-Load Stage *or* Post-Unload Stage
Time to Strain 1 vs Cycle	Creep Summary Data	PPC_CRP_SID	_01, _02, etc., i.e., 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of creep stages included in any cycle of the test	Post-Load Stage *or* Post-Unload Stage
Time to Strain 2 vs Cycle	Creep Summary Data	PPC_CRP_SID	_01, _02, etc., i.e., 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of creep stages included in any cycle of the test	Post-Load Stage *or* Post-Unload Stage
Creep Stage R^2 vs Cycle	Creep Summary Data	PPC_CRP_SID	_01, _02, etc., i.e., 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of creep stages included in any cycle of the test	Post-Load Stage *or* Post-Unload Stage
Initial Stress, 11-Axis vs Cycle	Relaxation Summary Data	PPC_RLX_SID	_01, _02, etc., i.e., 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of relaxation stages included in any cycle of the test	Post-Load Stage *or* Post-Unload Stage
Initial Stress, 22-Axis vs Cycle	Relaxation Summary Data	PPC_RLX_SID	_01, _02, etc., i.e., 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of relaxation stages included in any cycle of the test	Post-Load Stage *or* Post-Unload Stage
Initial Stress, 12-Axis vs Cycle	Relaxation Summary Data	PPC_RLX_SID	_01, _02, etc., i.e., 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of relaxation stages included in any cycle of the test	Post-Load Stage *or* Post-Unload Stage

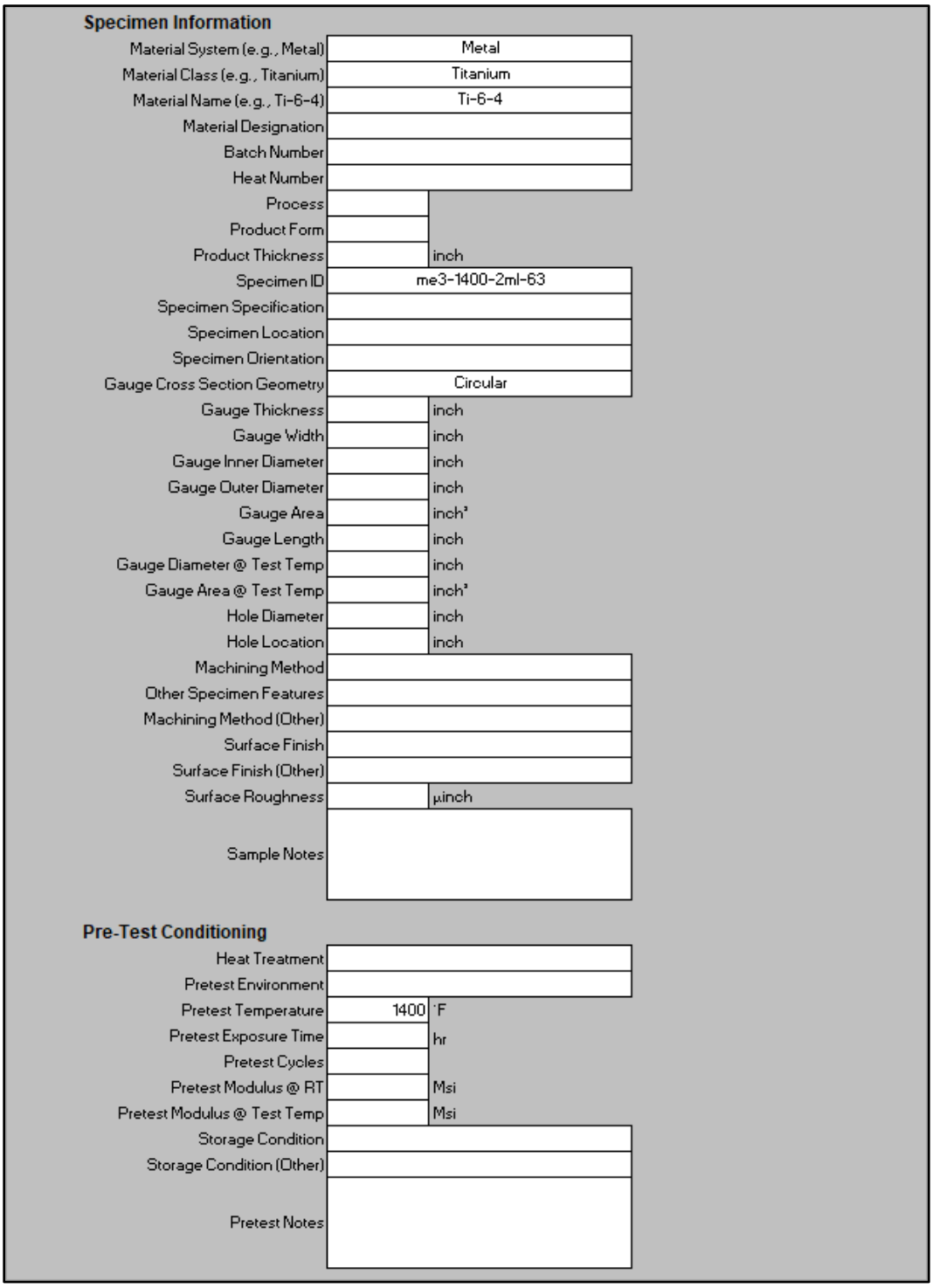
TABLE A.16.—GENERIC CYCLIC POSTPROCESSING UTILITY STAGE-BASED ATTRIBUTES FUNCTIONAL DATA SERIES SPECIFICATION

Database attribute name	Source data worksheet	Source data worksheet, Series ID range name root[b]	Series ID range name suffix[b]	Series ID value[b]
Final Stress, 11-Axis vs Cycle	Relaxation Summary Data	PPC_RLX_SID	_01, _02, etc., i.e., 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of relaxation stages included in any cycle of the test	Post-Load Stage *or* Post-Unload Stage
Final Stress, 22-Axis vs Cycle	Relaxation Summary Data	PPC_RLX_SID	_01, _02, etc., i.e., 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of relaxation stages included in any cycle of the test	Post-Load Stage *or* Post-Unload Stage
Final Stress, 12-Axis vs Cycle	Relaxation Summary Data	PPC_RLX_SID	_01, _02, etc., i.e., 2-digit sequential value, preceded by the "_" character, with a maximum value of the maximum number of relaxation stages included in any cycle of the test	Post-Load Stage *or* Post-Unload Stage

[a]Only one elastic strain range and one plastic strain range series is output for each Generic Cyclic test run.
[b]Series ID refers to the series identification.

Appendix B.—Additional Information Worksheet Specifications

Figure B.1 to Figure B.3 show the layout of the Additional Information worksheet and provide an example of how the worksheet will appear by default (i.e., without the user manually entering any data) following completion of a test run.



Specimen Information

Material System (e.g., Metal)	Metal	
Material Class (e.g., Titanium)	Titanium	
Material Name (e.g., Ti-6-4)	Ti-6-4	
Material Designation		
Batch Number		
Heat Number		
Process		
Product Form		
Product Thickness		inch
Specimen ID	me3-1400-2ml-63	
Specimen Specification		
Specimen Location		
Specimen Orientation		
Gauge Cross Section Geometry	Circular	
Gauge Thickness		inch
Gauge Width		inch
Gauge Inner Diameter		inch
Gauge Outer Diameter		inch
Gauge Area		inch²
Gauge Length		inch
Gauge Diameter @ Test Temp		inch
Gauge Area @ Test Temp		inch²
Hole Diameter		inch
Hole Location		inch
Machining Method		
Other Specimen Features		
Machining Method (Other)		
Surface Finish		
Surface Finish (Other)		
Surface Roughness		µinch
Sample Notes		

Pre-Test Conditioning

Heat Treatment		
Pretest Environment		
Pretest Temperature	1400	°F
Pretest Exposure Time		hr
Pretest Cycles		
Pretest Modulus @ RT		Msi
Pretest Modulus @ Test Temp		Msi
Storage Condition		
Storage Condition (Other)		
Pretest Notes		

Figure B.1.—Template-based file's Additional Information worksheet layout, part 1 of 3.

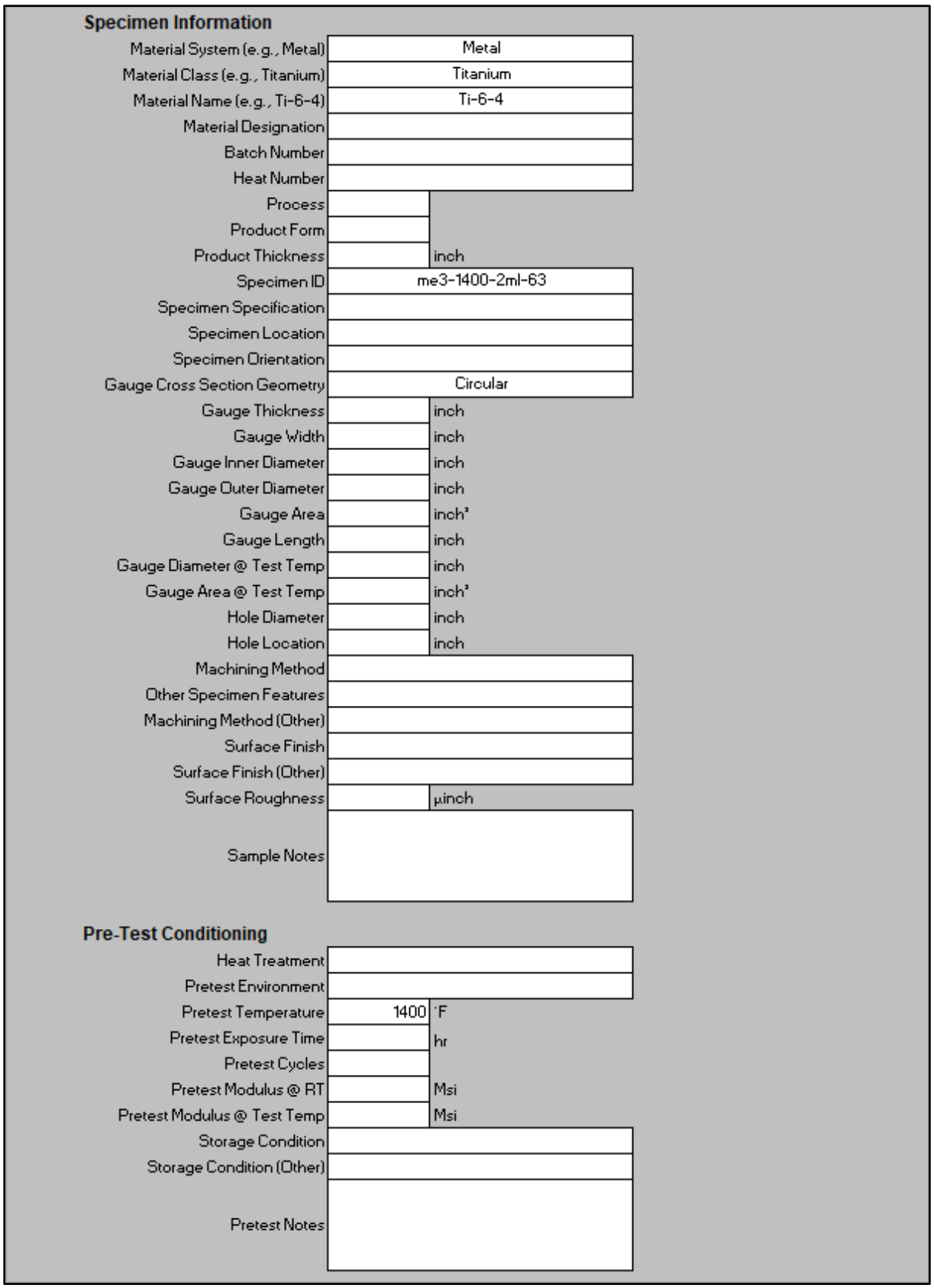


Figure B.2.—Template-based file's Additional Information worksheet layout, part 2 of 3.

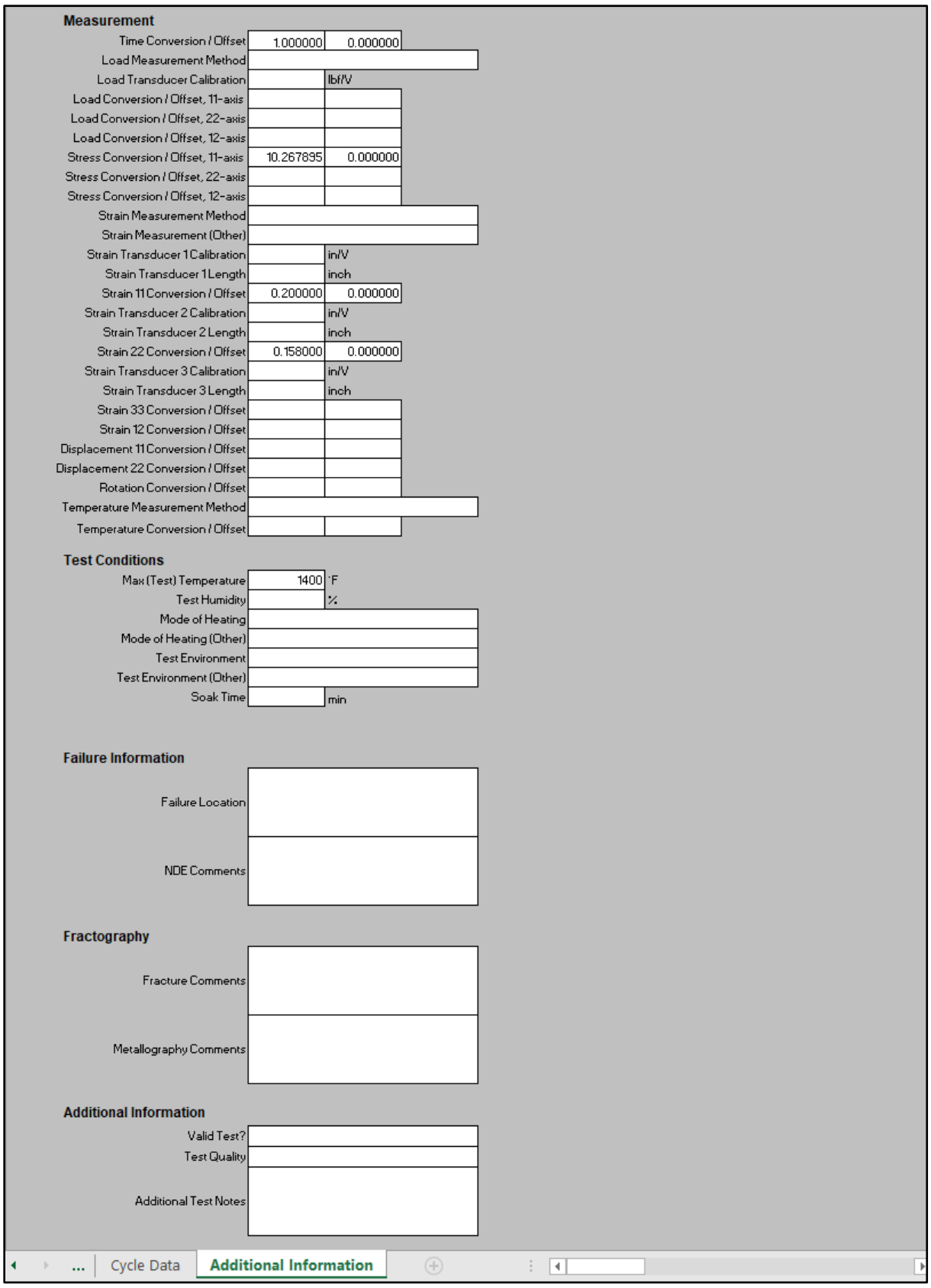


Figure B.3.—Template-based file's Additional Information worksheet layout, part 3 of 3.

References

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