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TTS Series of Computer Controlled Universal Testing Machines Specification Sheets

Revised: November 2011

Specifications for the following Models:

TTS-5KN (5 kN / 1,100 lb Capacity)
TTS-10KN (10 kN / 2,200 lb Capacity)
TTS-25KN (25 kN / 5,600 lb Capacity)
TTS-50KN (50 kN / 11,000 lb Capacity)
TTS-65KN (65 kN / 14,000 lb Capacity)
TTS-71KN (71 kN / 16,000 lb Capacity)
TTS-90KNA (90 kN / 20,000 lb Capacity)

1.0 Introduction to the TTS Series

The TTS Series of testing machines consists of seven bench top mounted universal testing machines which can be used for tensile and compression testing in the range from 5 kN (1,100 lb) up to 90 kN (20,000 lb). The design of these machines feature a double ball screw driven loading crosshead which travels between the upright ball screws. The Model TC-100 Tensile/Compression testing software included with the testing machine allows the TTS Series to be used for a wide variety of applications in both Quality Control and Research and Development testing of products and components. Additional software packages are available for performing creep tests and low cyclic fatigue testing. Figure 1 shows the 50 kN / 11,000 lb capacity TTS-50KN machine with the computer system used for data acquisition and system control. Figure 2 shows a view of the system load cell, optional strapping type tensile grips, and front control panel. Figure 3 shows a closeup view of the control switches on the front base panel and Figure 4 shows the connectors located on the rear base panel. Figure 5 shows the major dimensions of the TTS Series machines and the main part locations.

2.0 Mechanical Specifications

A summary of the mechanical specifications of the TTS series is as follows:

1. Test Speeds/Range

No Clutch Machines:
Models TTS-5KN and TTS-10KN
0.050 – 500 mm/min at 100% rated capacity
(0.020 – 20 in/min at 100% rated capacity

Low/High Speed Clutch Machines:
Low Speed Clutch Ratings:
Models TTS-25KN and TTS-50KN
0.05 - 75 mm/min at rated capacity
(0.002- 3.0 in/min at rated capacity)
Models TTS-65KN, TTS-71KN, and TTS-90KNA
0.05 - 50 mm/min at rated capacity
(0.002- 2.0 in/min at rated capacity)

High Speed Clutch Ratings:
Models TTS-25KN and TTS-50KN
0.50 - 500 mm/min at 20% rated capacity
(0.020 - 20 in/min at 20% rated capacity)
Models TTS-65KN, TTS-71KN, and TTS-90KNA
0.50 - 300 mm/min at 20% rated capacity
(0.020- 12.0 in/min at 20% rated capacity)

Note: Special modified versions of the TTS Series machines may have speed ranges different from those listed above. Please check the model number of the machine for the exact speed specifications.

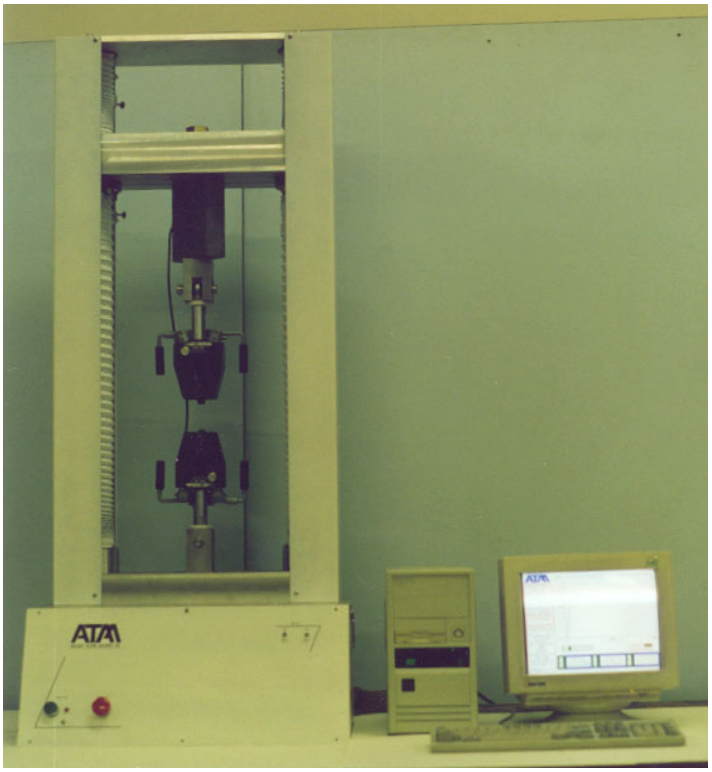


Figure 1
Model TTS-50KN Testing
Machine and Computer
Control System

Figure 2
System Load Cell, Optional
Strapping Tensile Grips,
and Front Control Panel

Figure 3
Front Panel Control Switches on Testing Machine Base

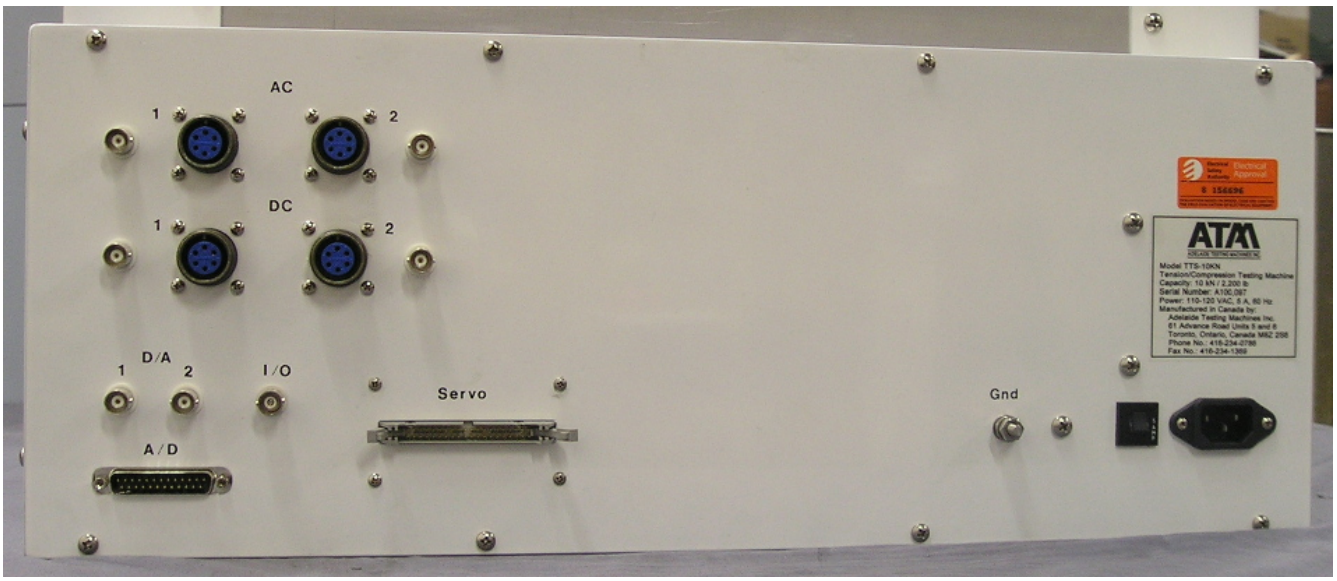
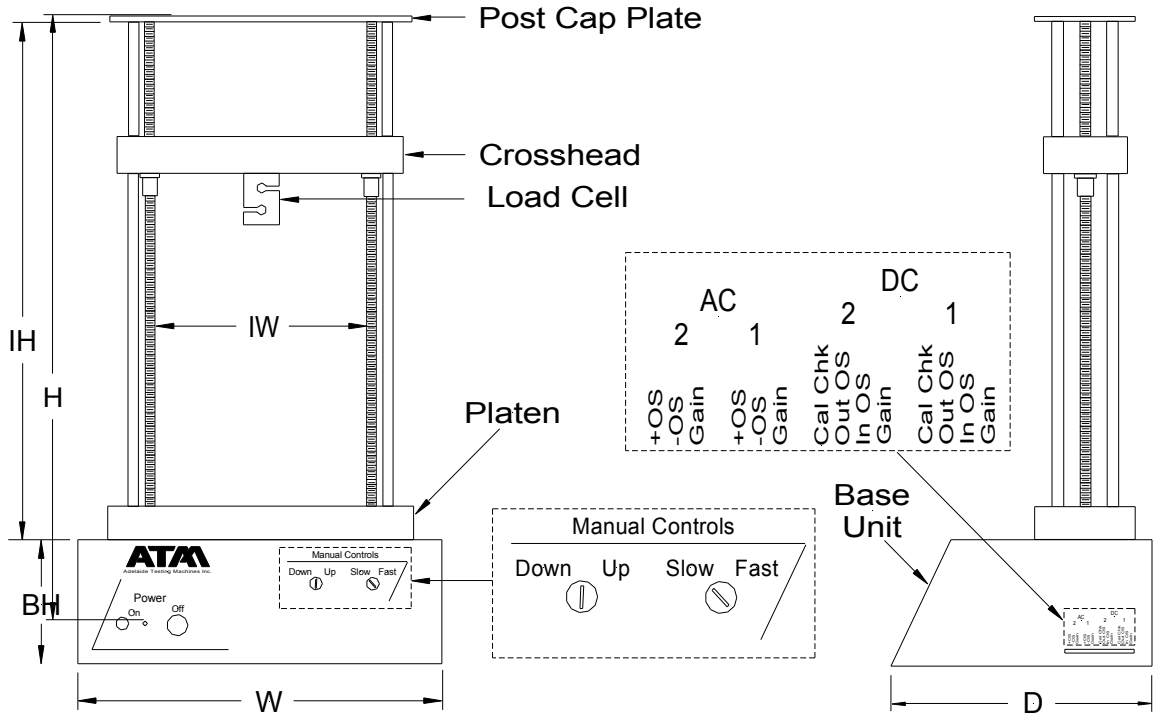


Figure 4
Connections on Rear Panel of Testing Machine



Model Number

Description	TTS-5KN	TTS-10KN	TTS-25KN	TTS-50KN	TTS-65KN	TTS-71KN	TTS-90KNA
Overall Ht., H	136.0 (53.5)	136.5 (53.8)	147.3 (58.0)	146.5 (57.7)	149.0 (58.5)	158.8 (62.5)	171.7 (67.6)
Platen to Top, IH	114.3 (45.0)	114.3 (45.0)	123.2 (48.5)	119.4 (47.0)	119.4 (47.0)	129.5 (51.0)	140.0 (55.1)
Base Height, H	20.3 (8.0)	21.0 (8.3)	21.8 (8.6)	26.0 (10.2)	28.0 (11.0)	26.7 (10.5)	29.8 (11.75)
Max. Width, W	54.4 (21.4)	54.4 (21.4)	61.0 (24.0)	65.0 (25.6)	65.0 (26.0)	65.0 (26.0)	84.1 (33.1)
Inner Working Width, IW	38.0(15.0)	38.0 (15.0)	40.5 (16.0)	40.5 (16.0)	40.5 (16.0)	40.5 (16.0)	57.2 (22.5)
Max. Depth, D	48.3 (19.0)	48.3 (19.0)	49.5 (19.5)	54.6 (21.5)	57.2 (22.5)	54.6 (21.5)	66.0 (26.0)
Machine Mass, kg	90	100	125	195	200	215	345
Weight, lb	200	220	275	430	440	470	755
Machine kN/mm	7	14	35	55	70	75	75
Stiffness, lb/in	40,000	80,000	200,000	315,000	400,000	430,000	430,000

(at 50 cm/20 in crosshead height)

Note:

1. Dimensions in Table are given in cm (in)
2. Machine Mass/Weight values do not include ballscrew covers, safety doors, or other options.
3. Ball screw bellows option reduces the stroke length approx. 10 cm (4 in)
4. Specifications and Dimensions are Subject to Change without Notice

Figure 5
Model TTS Series Tensile/ Compression Testing Machines
Major Dimensions and Parts Locations

2. 100 cm (40 in) maximum stroke length.

3. Minimum Machine Stiffness measured at 50 cm(20in) height:

Model TTS-5KN: 7 kN/mm (40,000 lb/in)
Model TTS-10KN: 14 kN/mm (80,000 lb/in)
Model TTS-25KN: 35 kN/mm (200,000 lb/in)
Model TTS-50KN: 55 kN/mm (315,000 lb/in)
Model TTS-65KN: 70 kN/mm (400,000 lb/in)
Model TTS-71KN: 75 kN/mm (430,000 lb/in)
Model TTS-90KN: 75 kN/mm (430,000 lb/in)

4. The loading mechanism consists of two ball screws protruding through the platen of the test machine which drives a loading crosshead. The crosshead moves vertically between the ball screws. The lower ends of the ball screws are mechanically coupled to a DC servo motor.

5. The drive motor is a DC servo motor with an encoder mounted on the rear shaft. The encoder is used for both crosshead position and speed calculations and control. Limit switches with adjustable intermediate stops are used to prevent overshoot of the crosshead at both upper and lower stroke positions.

6. Standard Load Cell: Rated for testing system capacity in tension and compression. Other load cell capacities are also available.

7. Power Requirements: 110 - 120 VAC, 60 Hz, 1 phase
220 - 240 VAC, 50 Hz, 1 phase

Specifications are Subject to Change without Notice

3.0 Computer Requirements and Motor Control System

The TTS Series of machines requires an IBM compatible Pentium type PC system with a color VGA monitor, hard drive, R/W CD or DVD drive, and a Windows compatible printer for printing test reports. One unused PCI slot must be available on the PC for the servo controller / data acquisition card. The ATM software requires Microsoft Windows2000 or the WindowsXP operating system. The motor control and data acquisition hardware consists of the PCI card, a motor control electronics system, and a combined DC and AC conditioners system. The PCI card features include a combination of 12 bits resolution A/D channels and servo motor controller capability. A 16 bits A/D resolution is available as an Option. The PCI card uses the encoder feedback signal and software commands to produce the motor control system command signal. The motor control system consists of a DC power supply for powering the DC servo motor and a DC servo amplifier for amplification of the servo controller card command signal.

Note: A 4 channel DC conditioner board is available as an option with the system as a substitute for the standard 2 channel AC / 2 channel DC conditioner board. The 4 channel DC conditioner board is preferred in systems that may require additional lower capacity load cells and extensometers for the tests to be performed on the system.

Two selector switches mounted on the front panel of the test machine base are used for Manual Control positioning of the crosshead. The crosshead is moved using the left spring loaded selector switch labelled Down/Up. The right selector switch labelled Slow/Fast is used to select the speed of the manual positioning motion. The speeds corresponding to the Slow/Fast positions are set from within the software. In TTS machines with a clutch system, the slow or fast speed range clutch is selected by using the F12 function key. Two DC and two AC conditioners are provided in the base of the testing machine on a single circuit board. All of the input connections from the rear panel and front mounted Manual Control switches are made to this board through connectors. The DC conditioners can be used for excitation and amplification of the ATM line of full Wheatstone bridge type load cells. The AC conditioners are used for excitation and amplification of LVDT type devices including certain types of extensometers and other position feedback transducers. Provision is made on the base rear panel for monitoring the conditioner output signals through female type BNC connectors. The 15 turn potentiometers accessible through a slot in the base right side panel are used for the 2 DC conditioners for electrical adjustment of the Gain, Input Offset (In OS), and Output Offset (Out OS) adjust. The AC conditioners have potentiometers for adjustment of the + Offset (+OS), - Offset (-OS), and Gain. In addition, the DC conditioners have a push button Calibration Check (Cal Chk) switch for a quick check of correct DC conditioner calibration. In a typical setup, the DC conditioner 1 is used with the standard capacity load cell and DC conditioner 2 is used for a Full Wheatstone bridge type extensometer or lower capacity rated load cell.

4.0 Data Acquisition System

Data acquisition for the standard system utilizes the 12 bit A/D channels on the PCI data acquisition / controller card. The connector marked Servo on the rear panel of the base of the machine is used to make the cable connection between the machine and the computer system.

The A/D input range is set at +/-10 VDC. For the standard system, an I/O port on the base rear panel is not used but is available for use in special applications. The AC and DC conditioner connections are made internally in the test machine base and are connected to the PCI card through the Servo connector. In addition, other connectors may have been mounted on the rear panel for input of other transducer signals in the particular system.

5.0 Computer Software Description

The TC-100 Tensile/Compression software package is the standard package included with a TTS Series machine. The software features a user friendly environment to perform the tasks necessary to run the system. The various features are available through use of the Function keys or clicking on the associated boxes. A brief description of the software is given as follows.

The Main Screen of the TC-100 software is shown in Figure 6. When the software is started, the data set and test parameters which are displayed on the X-Y graph are those which were current at the previous software shutdown. This data set and test parameters are stored in the TESTBAK.000 file. The present Tensile/Compressive and Yield Strengths for the data set are displayed in the Present Data box in the upper left hand screen.

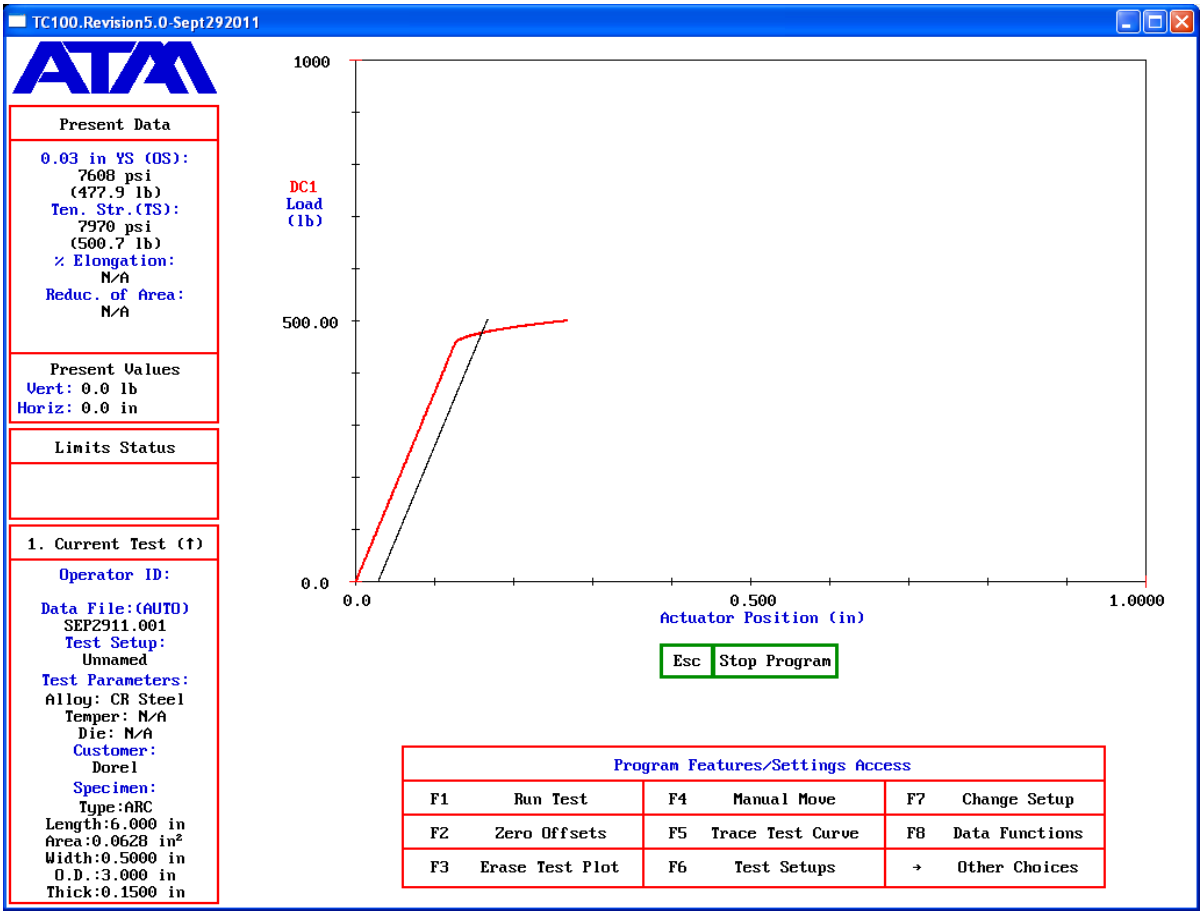


Figure 6
Main Screen Display of the TC-100 Software

Note: The Yield Strength will only be shown if the test was performed with an extensometer or crosshead position on the horizontal axis which is required to calculate the strain or the elongation in the specimen.

Below this box, the Limits Status box will show if any load, stroke, strain, or time limits are being exceeded. The Current Test box shows test setup parameters such as testing speed, data sampling rate, specimen type, specimen dimensions, etc. Additional screens for the Current Test box are accessed in the Main Screen configuration using the <UP ARROW> key or clicking in this box. The lower right portion of the screen displays the command descriptions of the keyboard function keys F1 to F8 and the <RIGHT ARROW> key box. The <RIGHT ARROW> key box is selected to display a second set of command descriptions for additional features.

The software design allows a high degree of Operator control of the testing configuration. The Operator can make changes to the display screen with the F7 Change Setup box with minimum disruption of the background display. Up to 1000 data sets can be stored at any given time in the directory which contains the software. The data file named TESTS.NAM contains a listing of the data sets that are available for display. The data set generated during a test can be stored to the hard drive with a filename which the Operator either enters or is automatically generated by the software. An additional archive copy can also be made of the data file to another specified folder. The resulting data files may be reloaded or erased from within the program.

Performing replicate tests is easily accomplished with a minimum number of Operator inputs. The system features the F2 Zero Offsets command for performing a software zeroing of an existing offset load resulting from changes in the test grips or test setup. An Crosshead Return feature which is activated at test completion may be chosen which automatically or after an Operator key input returns the crosshead to its position at the start of the test.

During a test, the results are displayed in Real-Time to the monitor on an X-Y plot. The current value of the individual point being displayed is updated during the test in the Present Data box. The test is stopped at a preselected end point determined by such parameters as maximum time limit, load limit, after sample breakage, % load drop after maximum value, or by pressing the <Esc> key. The values of the Tensile/Compressive Strength,% Elongation, and % RA (ie. Reduction of Area) are calculated and displayed after test completion. If an extensometer or crosshead position is used for the X axis, the Yield Strength (Y.S.) may also be displayed. At test completion, the individual data points may be scrolled with the F5 Trace Test Curve function using the <LEFT ARROW> and <RIGHT ARROW> keys or by inputting of the number of the data point to be displayed. Also, the data may be replotted by changing the axes scales or with different Engineering Units and the resultant data stored under a different filename. The F8 Data Functions key may be used to display multiple data sets for comparison, storing data sets, or erasing stored data sets.

For simplifying multiple test setup requirements, up to 100 test setups may be stored using the F6 Test Setups feature. These are listed in the SETUP.NAM file. When a test setup is loaded, the current data on the screen is automatically reconfigured for the new test setup X and Y axes and Engineering Units.

Other software features include the capability of printing a test report to a Windows compatible printer. Figure 7 shows an example of the one page test report format for the TC-100 Tensile/Compression software

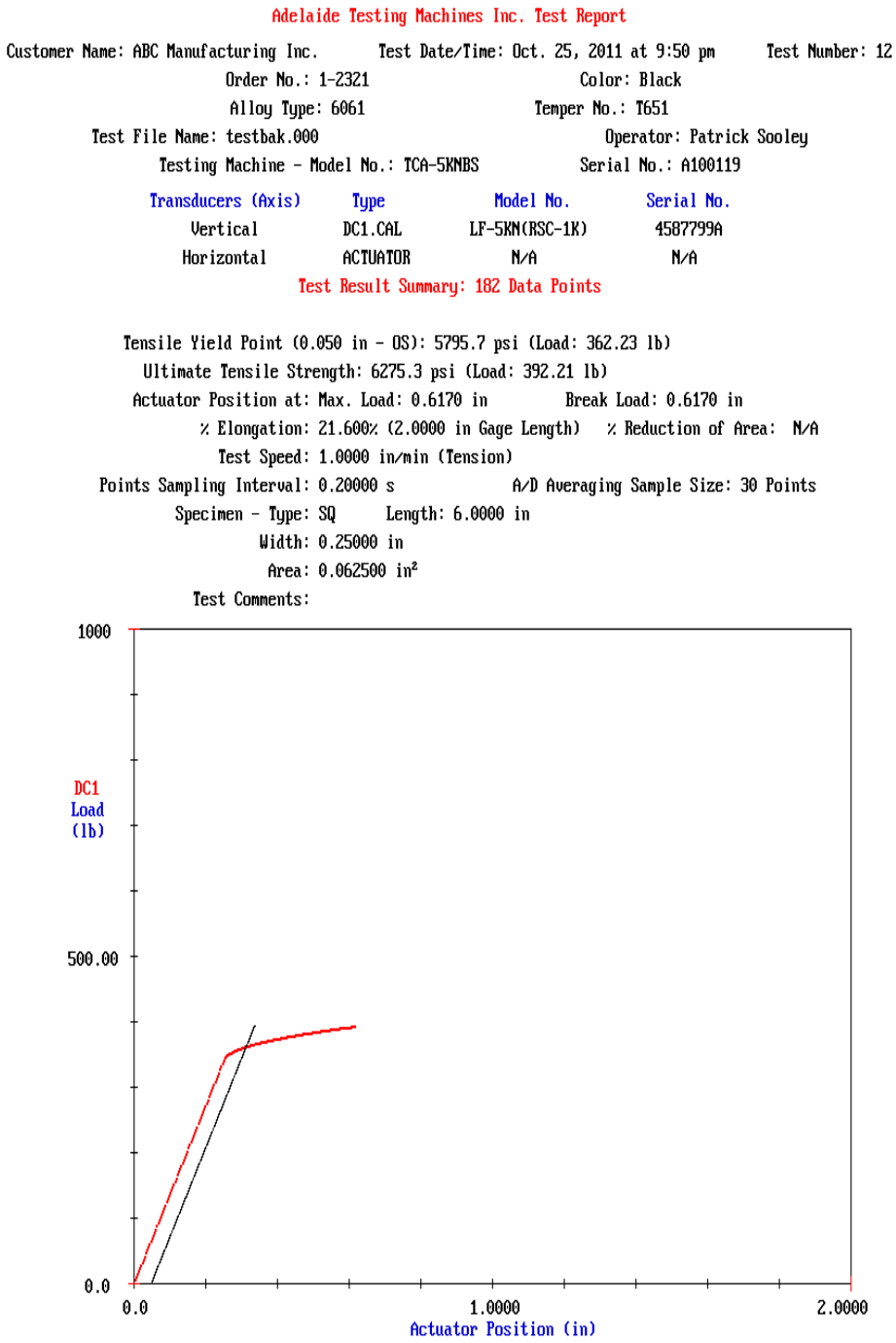


Figure 7
Test report for the TC-100 Tensile/Compression Software

package. The Operator may change the axes scales of the graph and view the results on the monitor before printout. The test report contains information such as the Test Parameter descriptions which may be preset by the Operator to include such parameters as Order No., Alloy, etc. In addition, the Test Date/Time and the Test Operator are also included in the report.

Other software packages are available for performing creep tests and low cycle fatigue cycling tests. In addition, existing software packages can be customized for unique testing requirements which can not be handled by the standard software package. Please contact Adelaide Testing Machines if you have requirements which can not be handled by our standard software packages.

6.0 Options and Accessories

Various options and accessories are available for use with the TTS Series of testing machines. Some of these are listed as follows:

A. Optional 4 Channel DC Conditioner – Part No.: TTSSERIES.4CHDC

This amplifier board replaces the 2 Channel DC, 2 Channel AC Conditioner amplifier on the standard system. The additional 2 channels of DC conditioners are useful for systems utilizing multiple load cells and extensometers.

B. Optional Safety Shield – Part No.: TTDS**KN.SAF

The safety shield package consists of two side panels and two front hinged door panels of polycarbonate sheet. The front two door panels are hinged to narrow front polycarbonate panels which are connected to the side panels. The side panels do not open. On the TTS Series, the side panels are attached to the upright sheet metal semi-enclosure protecting the ball screws. The front doors are secured in place by two sliding bolts prior to running a test.

The package includes two hinged front door panels, side panels and all mounting hardware. A complete set must be ordered for both front and rear of the test machine if required.

C. Optional Dust Covers (Bellows) on Ball Screws

Vinyl Type Part No.: TTDSKN.VINBSC**
Fabric Type Part No: TTDSKN.FABBSC**

Two materials are available depending upon the environment in which the machine is to be located. Vinyl type are available for relatively clean laboratory type environments. The more durable rubberized sewn fabric bellows are rated for dirtier environments and for applications where the bellows may be subjected to impact from broken specimens or sharp tools.

D. Optional Safety Shield Door Switches (Price for switches for 1 Safety Shield Package) – Part No.: TTSSERIES.SAFSW

For this option, limit switches are installed to monitor the open/close condition of the safety doors. In the TTS Series, the open door condition will stop the motor from operating in both the Manual Control operation of the machine and during the running of a test.

E. Additional Software Packages for TTS Series of Testing Machines

In addition to the standard TC-100 Tensile/Compression software package supplied with the machine, other software packages are available to perform a wide variety of tests. Two of these software packages are as follows:

a) Creep Testing Software - Part No.: CR-100
b) Low Cycle Fatigue Software (< 1 Hz.) - Part No.: FC-100

The standard packages may also be customized to include features to perform unique tests on the TTS Series. Please contact ATM if you have questions regarding the features of any of our software products or if you need custom features added.

F. Optional Load Cells

A large selection of optional load cells are available for use with the TTS Series for special testing situations. Please contact ATM if you need assistance selecting a proper size load cell.

G. Testing Grips

A wide selection of grips are available to perform tensile, compression, bending, and tear tests and others. Please contact ATM with your specific requirements for grips and fixtures.

H. High Temperature Testing Ovens

ATM custom builds split tube and box type chambers for applications of the TTS Series for elevated testing. Please contact ATM with your specific elevated temperature testing needs.

I. Other Modifications

ATM can supply special versions of the TTS Series machines for applications where the standard models will not meet the requirements. Modifications that can be supplied include increased stroke length, increased spacing between the ball screws, guided compression plates, modified speed ranges, horizontal versions, extremely low speed versions for corrosion testing, and others. Please contact ATM if you require a special modification of a TTS Series machine to meet your testing requirements.