SIMPSON
A Norican Technology

Operating Instructions

High Temperature Compression Tester

Model 42115

Type:	High Temperature Compression Tester
Model:	42115
Part No.:	0042115-ASM 0042115-220-ASM
Serial Number:	

Name and address of manufacturer:

Simpson Technologies
2135 City Gate Lane Suite 500
Naperville, IL 60563

For other Simpson Technologies offices around the world and for our contact information please visit us on the internet at simpsongroup.com on the Contacts page.

Table of Contents

1 Introduction

Congratulations, you have just purchased an extremely reliable sand testing instrument that is backed by the professional technical support and years of proven sand technology experience of Simpson Technologies .

This laboratory equipment is constructed of quality materials and is the result of unsurpassed craftsmanship. The High Temperature Compression Tester should be operated only when it is in perfect condition and in accordance with its designed purpose, with the operator aware of possible hazards. Observe the Safety instructions in Section 2 and Operating Instructions in Section 5.

1.1 Application and Designated Use

The High Temperature Compression Tester, Model 42115, is used to determine hot properties of molded sand with any type of binder (kaolinites, bentonites and chemical binders). The equipment operates with both; the American Foundry Society standard specimens (1.125” (28.58mm) diameter X 2” (50.8mm) high) and the Metric standard specimens (11.28 mm diameter X 20 mm high).Any other application outside the intended usage will be regarded as use not in accordance with its purpose, and, therefore, the manufacturer / supplier will not held liable for any damage that might arise thereunder. The risk in this case will be exclusively that of the User.

1.2 Organizational Measures

The operating instructions should be readily available at the place of operation. In addition to the operating instructions, the general legal regulations or other mandatory rules for prevention of accidents and environmental protection should be made known and be observed!

The personnel instructed to use this apparatus, before beginning work, should have studied and fully understood these Operating Instructions, in particular the Safety chapter.

No modifications, extensions or changes of design of the device that would impact safety requirements should be put into effect with prior consent of the supplier! Spare parts must conform to the technical specifications defined by the manufacturer. This is always guaranteed when using original spares.

2 Safety

NOTICE

Before operating and/or performing maintenance or repair on Simpson Technologies designed and/or manufactured equipment, it is required that all personnel have read and understood the entire Operating Instructions manual. If any questions exist, you must contact your supervisor or Simpson Technologies before taking further action.

If properly operated and maintained, your Simpson Technologies supplied equipment can provide many years of dependable and safe operation. Please follow all recommended safety, operating, and maintenance instructions. Furthermore, the introduction of any non-Simpson Technologies manufactured and/or approved parts to the equipment may create a hazardous situation. Never alter the equipment without prior consultation with Simpson Technologies .

DO NOT use this machine for purposes other than that for which it was intended. Improper use could result in death or serious injury.

2.1 Safety Signs and Labels

Simpson Technologies has incorporated the ANSI Z535.6 / ISO 3864-1-2 safety symbol only label format on all of its laboratory equipment. For the location of the safety labels on your equipment, refer to the "Location of Nameplate and Decals" drawing in Section 10.

The harmonized ANSI Z535.6 format became an established safety label format since it not only fully meets the current ANSI Z535 standards, but also incorporates ISO 3864-2 symbology and hazard severity panel and thus, can be used for both the U.S. and international markets.

2.1.1 Safety Alert Symbols

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. OBEY all safety messages that follow this symbol to avoid possible injury or death.

DANGER! *Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.*

The safety alert symbol used without a signal word to call attention to safety messages indicates a potentially hazardous situation which, if not avoided, could or may result in death or minor to serious injury.

NOTICE indicates information used to address practices not related to personal injuries but mayresult in property damage.

This symbol indicates information containing important instructions concerning the use of the machine or directions for further procedures. Ignoring this information can lead to malfunction of the machine.

2.1.2 Safety Symbol Labels

DO NOT TOUCH - HOT SURFACE
(STC #214045)

This label is located on the High Pedestal Support and in the Specimen Tray

While performing a test or calibrating the Sand Rammer; the ramming weight free falls, striking the anvil every time the main cam completes one revolution while preparing a sand specimen. Also, when placing the anvil with the weight in the upper position for calibrating or housekeeping purposes, the weight and anvil will free fall if the auxiliary cam is not in the locked position, which may crush or cut body parts if Safety System Procedures are not followed. When performing any maintenance, the anvil and weight must rest on the frame; this will put the sand rammer into Zero Mechanical State (ZMS).

ELECTRICAL SHOCK / ELECTROCUTION
(STC #214043)

This label is located on the rear panel of the control cabinet and in the furnace junction box

When the front panel or any other panels from the control panel or the junction box cover are removed, electrical terminals are exposed. A hazardous voltage is present, can cause electric shock or burn, and may result in serious injury or death. Follow Lockout and Tagout procedures before servicing.

EXPLOSION / RELEASE OF PRESSURE
(STC #217945)

This label is located on the back panel of the unit by the pneumatic tubing connections.

With pneumatic pressure present, disconnecting or cutting the pneumatic tubing will release the pressure contained within the tubing. Blown-out air with or without solid particles in the air stream may get into the eyes and may irritate or damage the eye. Follow Lockout and Tagout procedures before servicing.

EXPLOSION / RELEASE OF PRESSURE
(STC #217945)

This label is located on the left front panel of the High Temperature Compression Tester

The High Temperature Compression Tester sliding furnace and adjoining parts are extremely hot. Contact may result in serious burns to skin. DO NOT TOUCH unless protective gloves are worn. Follow Lockout and Tagout procedures and allow surface to cool before servicing.

WEAR SAFETY GOGGLES
(STC #205308)

This label is located on the left front panel of the High Temperature Compression Tester

When operating the High Temperature Compression Tester, the sand specimen may break before, during or after the test and sand may blow-off to the surroundings and get into the eyes and may irritate and/or damage the eye. Follow Lockout and Tagout procedures before servicing.

READ AND UNDERSTAND ALL SERVICE MANUAL INSTRUCTIONS
(STC #214081)

This label is located on the left front panel of the High Temperature Compression Tester

Before operating and/or performing any maintenance or repair on Simpson Technologies designed and/or manufactured equipment, it is required that all personnel read and understand the entire Operating Instructions manual. If any questions exist, you must contact your Supervisor or Simpson Technologies before taking further action. Follow Safety System Procedures before servicing.

2.2 Lockout and Tagout System Procedures

NOTICE *Whenever performing any type of maintenance or repair, whether in the form of cleaning, inspection, adjustment or mechanical maintenance, the equipment must be rendered into* ***Zero Mechanical State (ZMS)****.*

Prior to any maintenance (routine or otherwise) or repair of equipment, a safety procedure should be established and maintained. This procedure should include training of personnel; identification and labeling of all equipment which is interlocked mechanically, through levers, gravity or otherwise; and a listing of the established procedures posted on each equipment.

"Lockout and Tagout" refers to specific practices and procedures to safeguard personnel from the unexpected energizing of machinery and equipment, or the release of hazardous energy during service or maintenance activities. This requires, in part, that a designated individual turns off and disconnects the machinery or equipment from its energy source(s) before performing service or maintenance, and that the authorized employee(s) lock or tag the energy-isolating device(s) to prevent the release of hazardous energy and take steps to verify that the energy has been isolated effectively.

2.3 Lockout and Tagout Devices

When attached to an energy-isolating device, both lockout and tagout devices are tools used to help protect personnel from hazardous energy. The lockout device provides protection by holding the energy-isolating device in the safe position, thus preventing the machine or equipment from becoming energized. The tagout device does so by identifying the energy-isolating device as a source of potential danger; it indicates that the energy-isolating device and the equipment being controlled may not be ordered until the tagout device is removed.

2.3.1 Glossary:

Authorized Person(s) - Personnel who have been designated by his/her department to perform maintenance or service on a piece(s) of equipment, machinery or system, and are qualified to perform the work through proper training on the Lockout/Tagout procedures for the equipment, machinery or system.

Lockout - The placement of a lockout device on an energy isolating device, in accordance with an established procedure, to ensure that the energy isolating device and the equipment being con- trolled cannot be operated until the lockout device is removed.

Lockout Device - Any device that uses positive methods, such as a lock (either key or combination type), to hold an energy isolating device in a safe position, thereby preventing the energizing of machinery or equipment. When properly installed, a blank flange or bolted slip blind are considered equivalent to lockout devices.

Tagout - The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being con- trolled may not be operated until the tagout device is removed.

Tagout Device - Any prominent warning device, such as a tag and a means of attachment that can be securely fastened to an energy isolating device in accordance with an established procedure. The tag indicates that the machine or equipment to which it is attached is not to be operated until the tagout device is removed in accordance with the energy control procedure.

Zero Mechanical State - The mechanical potential energy of all portions of the equipment or machine is set so that the opening of pipes, tubes or hoses, and the actuation of any valve, lever or button, will not produce a movement which could cause injury.

3 Short Description & Specifications

3.1 Description

The Furnace: The furnace is powered by a transformer and a solid-state relay and heated by a 1700 watts electric resistance heating element. A quartz tube isolates the heating element from the working area which consists of the specimen and upper and lower pedestals. A digital temperature controller regulates the temperature of the furnace. The furnace is raised vertically by a pneumatic piston. If a power failure is experienced the furnace rises up automatically and remains in that position. A safety system stops the heating of the furnace and raises the furnace whenever coolant flow is lost and/or the coolant plate temperature goes up.

NOTICE *Max operating temperature for this machine is 1900F. Temperatures above this can cause damage to the furnace and claims under guarantee will no longer be considered.*

A safety system stops heating the furnace and raises it whenever coolant flow is lost and/or the coolant plate temperature goes up.

Load Measurement: Loads are measured by an electronic load cell with capacity up to 5000 Newton. A coolant plate is positioned between the load cell and bushing to help avoid any transmission of heat through the lower pedestal to the electronic load cell. The signals that the load cell sends are displayed on the LCD screen either as specific resistance value (N/cm2 or PSI), or as force (Newton or pounds), depending on the test and the standard used.

Deformation Measurement: By means of a displacement transducer directly mounted on the pushing ram of the hydro pneumatic press. The displacement readings allow deformation appreciations of:

For metric specimen (h=20 mm): 0.031%

For the AFS specimen (h=50.8 mm): 0.012%

Computer: Industrial PC with monitor and keyboard. The operator selects the type of test and test standards with the keyboard.

Each test is displayed in (Real Time) and maximum values on a user friendly screen.

3.2 The High Temperature Compression Tester includes:

One printer, 3 sets of specimen supports, pneumatic Filter-Regulator-Lubricator (FRL), pneumatic hose and connectors to connect the supplied FRL to the instrument and a cooling tank-pump system. Specifications, Dimensions and Weights (Approximate)

The loads that act during all high temperature tests are measured by means of an electronic load cell. The screen displays the specific forces (resistances) according to the selected standard. When calibrating the load cell, the screen displays the loads expressed in Newton (N).

The displacement sensor featured by the apparatus enables it to measure.

- Hot deformation is the deformation (strain) that the specimen suffers during the application of load at a determined temperature.
- Linear expansion is the expansion the specimen experiences when heated at a determined temperature.
- Restraining load test is the force that must be applied to prevent the expansion of the specimen when heated to a determined temperature.

The equipment consists of:

1. A hydro-pneumatic press that applies a load to the specimen being tested. The system includes a manual regulating valve to control the rising speed of the press.
2. A furnace to heat the specimen. The furnace temperature is regulated by an accurate digital controller and indicator. The furnace is moved up and down over the prepared specimen by a pneumatic cylinder.
3. A coolant pump unit that pumps coolant oil through a coolant plate on the electronic load cell to keep cools the load cell.
4. A digital timer that controls the heating time of the specimen. At a specified time, the hydro-pneumatic press compresses the specimen.
5. An electronic load cell that displays digitally the resistance value.
6. A displacement sensor that measures the positive and/or negative strain of the specimen.
7. A computer with monitor and keyboard that stores and processes the test data.
8. Power: 110/220 V, 50/60 Hz on request, 2 Kw
9. Pneumatic Connection: Filtered, lubricated and regulated air from 5 - 5.4 bar (72-80 PSI) Filtering, regulating and lubricating air equipment is supplied.

Specifications	High Temperature Compression Tester
Length	1050mm (41.5”)
Width	430mm (17”)
Height	900mm (35.5”)
Weight	126 kg (278 lbs.)

4 Unpacking and Installation

4.1 Unpacking

NOTICE

Your new Laboratory Equipment has been closely inspected before being shipped to your plant. However, damage can occur in route, so it is wise to inspect all equipment on arrival. Notify both the carrier and Simpson Technologies of any damage at once. Damage should be noted on the shipper's receipt before signing for receipt of the shipment.

The High Temperature Compression Tester Model 42115 is shipped in two primary pieces consisting of the High Temperature Compression Tester apparatus and the Coolant Tank-Pump Assembly. Both pieces are designed to be connected by a reinforced PVC hoses. Lifting equipment is required for handling the High Temperature Compression Tester; the Tester weighs approximately 126 kg (278 lbs.). The Coolant Tank-Pump Assembly due to its bulky dimensions and tight fitting shipping crate, it is recommended that two people should be utilized, the approximate dimensions are 305 mm Dia. x 445 mm H (12” Dia. x 17.5” H) and weight 11.5 Kg. (25 Lbs.).

1. Remove any loose accessories/parts within from the shipping crate and place in a location away from any packaging material to assure that these items are not misplaced.
2. Carefully remove the High Temperature Compression Tester and Coolant Tank-Pump from the packing crate and place on stable bench.
3. Once removed from the crate, proceed by taking off any protective wrap and unpackaged the protective material from the included accessories.

4. The packaging remains the property of the Customer and may be used for returning the apparatus if some repair is required.

4.2 Components

Your new High Temperature Compression Tester, Model 42115, is shipped with the following accessories and installation components.

Please take a moment and identify that the following items are included:

- Coolant Tank-Pump Assembly.
- Air filter, regulator, lubricator and fittings to connected them together.
- One 4mm I.D. pneumatic blue tubing, one meter long.
- Two #10 threaded mufflers.
- One male quick connector G1/8 to 4 mm I.D. tubing.
- One pipe adapter G1/8 to1/8 NPT.
- One keyboard.
- One data USB flash drive.
- One service USB flash drive.
- One calibration gage with magnetic base and one calibrating post.
- One aligning plate.
- Six steel lentils.

If any of the above components are missing, contact your local Simpson Technologies office.

NOTICE *Do not store the device in the open and unprotected from atmospheric conditions. If this instruction is not followed, claims under guarantee will no longer be considered.*

4.3 Installation

The installation of the apparatus is the responsibility of the Client to include procuring and preparing the material required for this purpose.

The High Temperature Compression Tester, Model 42115, is designed to work with a cooling tank-pump system located on a stable bench; they required electrical and pneumatic power which must be correctly installed. The cooling tank-pump must be filled with 5 gallon of turbine oil ISO grade 22 (SAE 5 W) and should be next or underneath the High Temperature Compression Tester within 2M (6.5 ft.). In order to guarantee proper performance the bench should stable and have plenty of space for clear access to both the Tester and the Cooling unit. The High Temperature Compression Testers intended for operation by one operator. It is recommended for use in a foundry sand laboratory, with its operation display and programming buttons placed at a level for easy use and observation by the operator.

BURN HAZARD! *The High Temperature Compression Tester furnace is extremely hot when the tester is in operation. Always use gloves and be cautious when working with or around the tester. Hot surfaces can burn hands and body parts.*

4.4 Electrical Power Requirements

Electrical Requirements: 110 or 220 Volts, 50-60 Hz.

The High Temperature Compression Tester can be manufactured to accept 110 Volt, 50-60 Hz or 220 Volt, 50-60 Hz electrical power. Refer to the specification name plate located on the back side of the Tester to verify the electrical requirements.

Before connecting this equipment to power, verify that the voltage marked on the serial number nameplate is the same as the electrical outlet to be used for the machine. Outlet must be properly grounded! Failure to follow safety procedures could result in serious injury.

4.5 Set-up

Before attempting to connect the High Temperature Compression Tester, turn off the Lock-Out air supply valve to the Tester, switch the power switches to the off position and be certain that the electrical power cords are disconnected from the wall receptacles on both the Tester and the Cooling Unit. Failure to follow safety procedures could result in serious injury.

4.5.1 Connecting the High Temperature Compression Tester and the Cooling Tank-Pump Assembly

1. Assemble the air filter, regulator and lubricator in that order using the fittings provided. Install the F-R-L to the air lock-out valve (supply by end user) on the plant supply airline, it should have a minimum pressure of 6 bar (87 PSI) air pressure, if required use the pipe adapter G 1/8 to 1/8 NPT (provided) on the filter side of the F-R-L and on the lubricator side install the G1/8 quick male connector (provided).

2. Place the High Temperature Compression Tester on the bench (stable) where is going to be operating and position the Cooling Tank-Pump Unit in close proximity to it, no more than 1.5 M (6 ft.) from the Tester

3. Cut and put aside two 25mm (1") long pieces from the 4mm I.D. blue tubing (provided) then connect one side of the remaining tubing to the F-R-L quick connector and the other side to the connector mark "AIR IN" on the back of the Tester (see #1 fig. 1).

4. Remove the two nuts from the connectors mark "AIR OUT" on the back of the Tester (see #2 fig. 1), insert the 25mm tubing into each connector nut and reinstall the nuts with the tubing in the connector bodies. Insert (screwed) into each 25mm long tubing one #10 muffler (provided).

5. Connect the hose labeled "Discharge Pressure" to the port labeled "Fluid Coolant In" on the back of the Tester and connect the hose labeled "Return" to the port labeled "Fluid Coolant Out". (see #3 and #4, fig. 1)

6. Open the plant air supplied lock-out valve and adjust the air regulator to 4 bar (58 PSI).

7. Verify the voltage on the specification plate located on the back of the High Temperature Compression Tester (see #5, fig. 1). Connect the power cord located in the back panel of the tester into a wall electrical receptacle. (see #6, figure 1).

Some areas may require an electrical plug that is not supplied with the power cord to properly conform to the specific electrical outlet. These electrical plugs will need an electrical plug adapter and to be purchased separately by the customer.

8. Connect the power cord from the furnace into the receptacle located in the back panel of the Tester. (see #7, fig. 1)

9. Connect the thermocouple from the furnace into the receptacle located in the back panel of the Tester. (see #8, fig. 1)
10. Connect the keyboard to the keyboard port on the right side of the machine. Next to the USB port.
11. Fill the cooling pump tank with turbine oil ISO grade 22 (SAE 5 W) STC part number 0042156.

Once all connections are properly made the High Temperature Compression Tester is ready to be used.

Figure No.1

Tester Back Panel

1	Compress Air Inlet.
2	Compress Air Exhausts.
3	Coolant Fluid Charge.
4	Coolant Fluid Return.
5	Tester Nameplate.
6	Main Power Cord.

7	Furnace Power Receptacle.
8	Furnace Thermocouple Receptacle.
9	Coolant No Flow Alarm.
10	Fuse Block.
11	Oil Fill Ascending Hydro-Pneumatic Reservoir.
12	Oil Fill Descending Hydro-Pneumatic Reservoir.
13	Oil Drain Ascending Hydro-Pneumatic Reservoir.
14	Oil Drain Descending Hydro-Pneumatic Reservoir.

NOTICE *It is highly recommended that a voltage stabilizer/filter (line conditioner) is installed between the electrical outlet and the inlet of the High Temperature Compression Tester. This device will help to ensure the proper performance of the High Temperature Compression Tester. It will also help to eliminate/reduce potential premature failures of the electric furnace.*

4.6 Airborne Noise Emission

The equivalent continuous A-weighted sound pressure level at the workstation does not exceed 70db(A).

5 Operating Instructions

For more information on how to use and care for your Simpson Analytics equipment and accessories visit our Simpson Technologies channel on YouTube and search our library of videos. Subscribe to our channel to keep updated on new releases.

BURN HAZARD! *The High Temperature Compression Tester lower and upper pedestal, lentils and sand specimen is extremely hot when the tester is in operation; always wear gloves and be cautious when working with or around the tester. Extreme caution must be observed when unloading the sand specimens from the lower pedestal due to the high temperatures present at the heating furnace and adjoining parts.* ***Hot*** *surfaces can* ***burn*** *hands and body parts.*

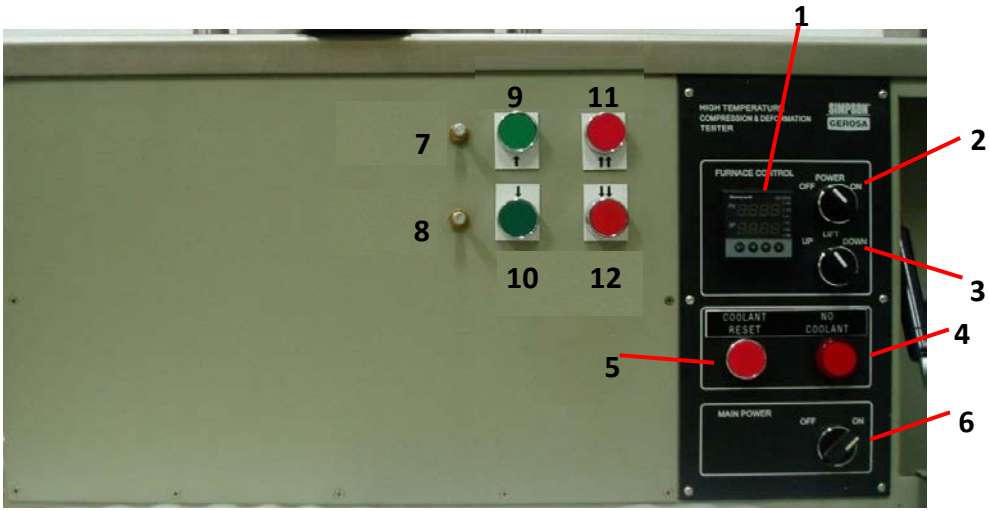


Figure No. 2

Tester Front Panel

1	Furnace temperature controller.
2	Furnace power ON - OFF switch.
3	Manual switch for UP and DOWN furnace displacement.
4	No coolant alarm.
5	Alarms reset.
6	Main power ON - OFF switch.
7	Lower pedestal ascent rate flow control valve.
8	Lower pedestal descent rate flow control valve.
9	Actuating button for lower pedestal slow ascent.
10	Actuating button for lower pedestal slow descent.
11	Actuating button for lower pedestal fast ascent.
12	Actuating button for lower pedestal fast descent.

For further information regarding the temperature controller, refer to the temperature controller manufacturer's manual in Section 10 of this manual.

5.1 Performing a High Temperature Compression Test

1. Turn on the air supply and verify the correct air pressure setting (4 bars) on the incoming air regulator to the High Temperature Compression Tester.
2. Connect power cord to wall receptacle & keyboard to the Tester.
3. Turn ON Tester main power switch. The Main Menu screen HTCD is displayed (see screen # 1)
4. The Main Menu displays the following submenus;
    - RL Test (Restraining Load Test)
    - EX Test (Expansion Test)
    - S&D Test (Strength and Deformation Test)
    - SETUP
    - ABOUT
    - QUIT

To select any of these submenus use the right or left arrow keys, when the submenu required is highlighted depress "Enter".

Screen No. 1

5.2 Test Descriptions and Operation

In this section the different test procedures are outlined.

5.2.1 RL Test (Restraining Load Test)

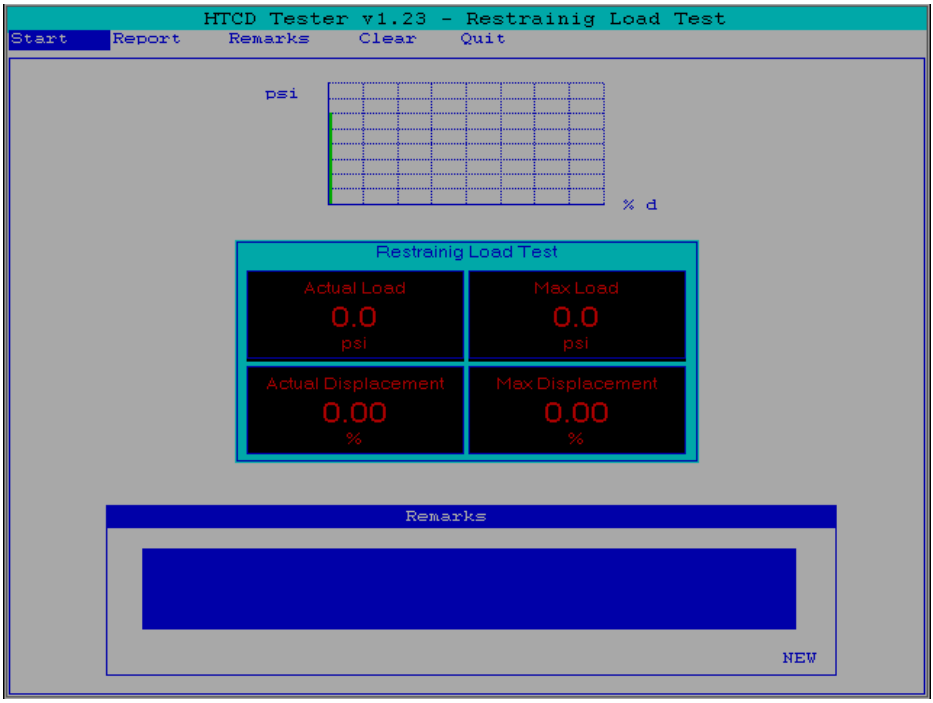
This test determines the force that must be applied to prevent the expansion of a specimen when heated to a chosen temperature.

1. Set the temperature controller to the desired temperature to test the sand specimen. Wait until the furnace has reached the desired temperature. (See Temperature Controller Operating Manual)
2. Put the furnace into the lower position using the lift switch located on the front panel of the machine.
3. From the HTCD main menu screen (screen #1), select the RL Test.
4. The HTCD Restraining Load Test screen is displayed (screen #2).

This screen has five options:

- START: Starts the Restraining Load Test.
- REPORT: Prints the Test.
- REMARKS: Characteristics of the Test can be typed in the lower frame of the screen.
- CLEAR: Clear the screen for the next Test.

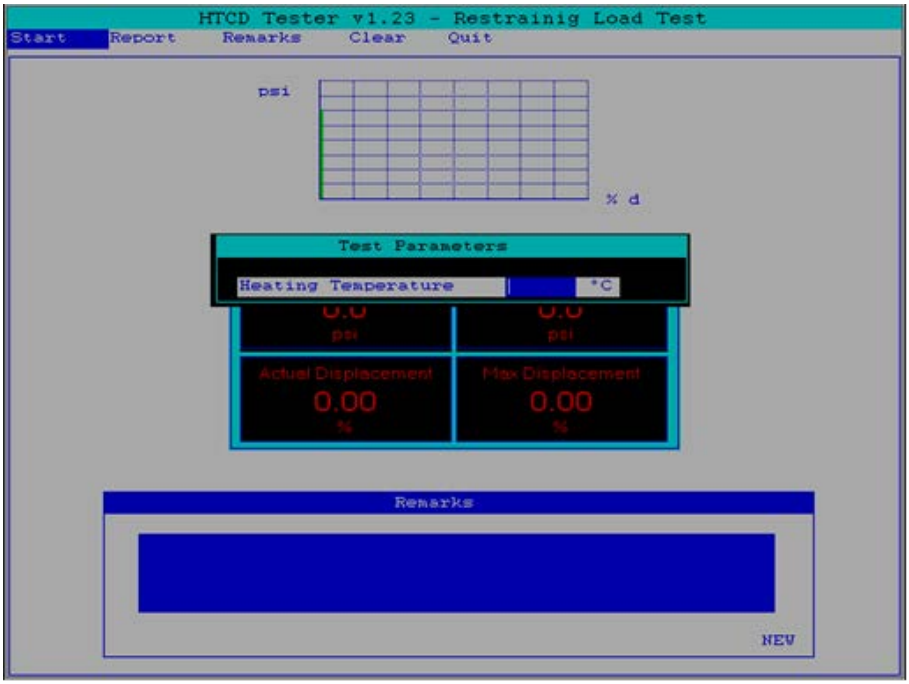
- QUIT: Escapes from the current screen and returns the user to the HTCD Main Menu screen.



Screen No. 2

5. Using the keyboard arrow buttons select START and press ENTER.

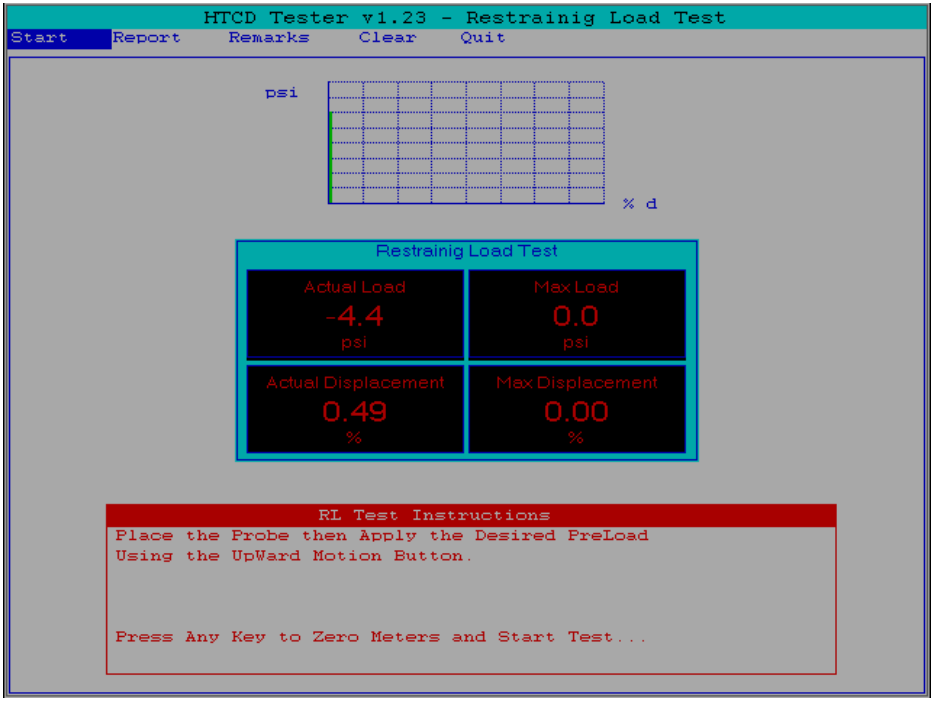
6. Enter the selected test temperature in the “Test Parameters” window and then press ENTER. (see screen #2A)



Screen No. 2A

7. After filling in the test temperature, the following message appears at the bottom of the restraining load test screen. (see screen #2B)

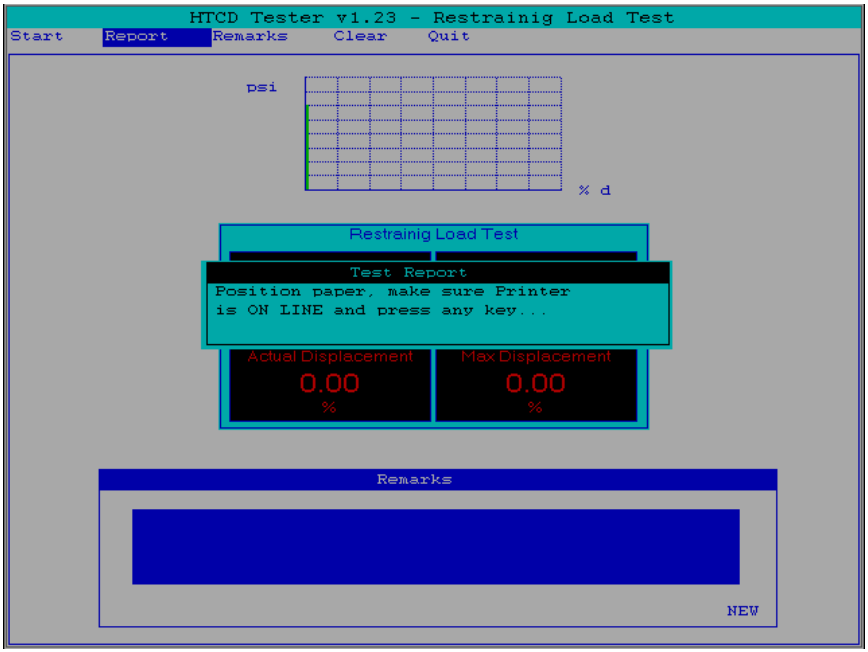
   - "Place the Probe then apply the desired preload using the upward motion button.
   - Press any key to zero meters and start test."



Screen No. 2B

BURN HAZARD! The High Temperature Compression Tester lower and upper pedestal, lentils and sand specimen is extremely hot when the tester is in operation; always wear gloves and goggles and be cautious when working with or around the tester. Extreme caution must be observed when unloading the sand specimens from the lower pedestal due to the high temperatures present at the heating furnace and adjoining parts. **Hot** surfaces can **burn** hands and body parts.

8. Lift the furnace using the Up position of the Lift selector switch. Place the specimen between the two quartz lentils. Then place the specimen and lentils between the low and high pedestals. Pushing button 9 (Figure 2) lift the lower pedestal until the upper lentil on the specimen contacts the higher pedestal and shows a load of 1 N/cm2 on the test screen under the Actual Load. Immediately release button (9), lower the furnace and start the test by pressing any key on the keyboard.
9. While the test is in progress, make certain no displacement (deformation/strain) of the specimen occurs. Any displacement must be counteracted by intermittently pushing button 10 to lower the bottom pedestal (figure 2).
10. The load increases until it stabilizes and then decreases. The maximum value appears on the screen. This maximum value is considered the restraining load of the particular specimen.
11. Once it has been determined that the load is no longer increasing press the enter button on the keyboard to stop the test.
12. Use the Lift switch to raise the furnace to the upper position and allow the sand specimen and lentils to cool for 5-10 minutes.
13. The REPORT function allows for the printing of the test data. Follow the prompts after the report function has been selected to print the report.



14. The REMARKS function allows for information pertaining to the test to be entered that will then be printed with the other test data. Press enter several times until the word Ready appears in the lower right of the remarks window. Then go to Report for printing.
15. The CLEAR function allows for the present test data to be cleared and the next test can be started.
16. The QUIT function ends the current test and returns the user to the Main Menu screen.

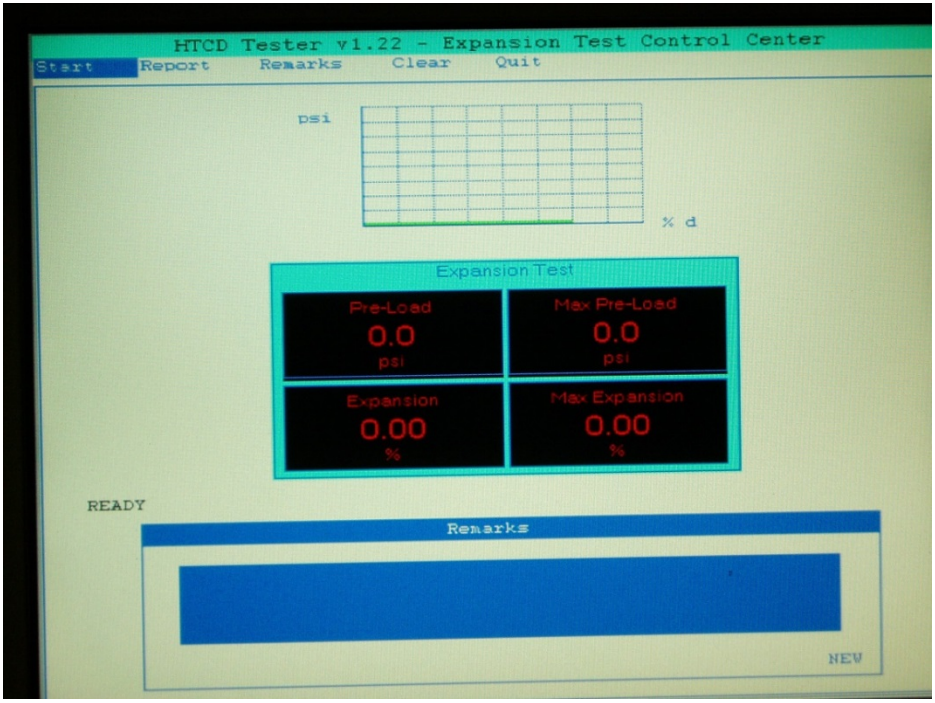
17. After the options mentioned above have been selected, or not selected, use the tongs to remove the specimen that was just tested and the lentils and place into the tray that is located at the bottom of the lower pedestal for additional cooling. Do not touch the specimen or lentils for at least ½ hour. These can remain in the tray while performing other tests.

5.2.2 (EX) Test (Expansion Test)

This test determines the expansion of a specimen when heated without any load (free expansion) or with a very small preload. The most common temperature applied is 982 degrees Celsius (1800 degrees Fahrenheit). This test will require continuous monitoring and adjustments of the lower pedestal.

Set the temperature controller (#1 Fig. 2) to the desired temperature (see the Temperature Controller Manual). Put the furnace into the lower position using the Down position on the Lift switch located on the front panel of the machine (#3 Fig. 2) and wait for the furnace to reach the selected temperature.

1. On the HTCD Main Menu screen select the EX Test to get to the Expansion Test Control Center screen.
2. Select START on the test screen using the arrow keys on the keyboard and press enter when Start is highlighted.



3. Type in the temperature that has been selected on the temperature controller in the Test Parameters window and then press the enter button on the keyboard.

4. An “Expansion Test Instructions” window is now seen at the bottom of the screen and has instructions for placing the lentils and specimen (referred to as the Probe). The instructions of “Place the Furnace” indicate the furnace must be lowered and then the probe (sand specimen) can soak until it has reached the set temperature. 12 minutes is a typical soak time.

5. Raise the furnace using the Up position on the Lift selector switch located on the front panel of the machine (#3 Fig. 2) and then use the tongs provided with the machine to place the sand specimen and lentils on the lower pedestal. Do not touch the lower or upper pedestals at any time during the probe placement.

BURN HAZARD! *The High Temperature Compression Tester lower and upper pedestal, always wear gloves and be cautious when working with or around the tester.* ***Hot*** *surfaces can* ***burn*** *hands and body parts.*

6. Use button 9 or 11 to raise the lower pedestal and set a desired preload of 1-2 N/ cm2 (probe lentil will touch the upper pedestal) which is shown in the “Actual Load” portion of the restraining load test window. Lower the furnace using the Lift selector switch (#3 Fig. 2) and allows the probe time to reach the selected temperature for the test.
7. Press any key on the keyboard to start the test.
8. Keep the preload of 1-2 N/cm2 by pushing button 10, which slowly lowers the lower pedestal. Notice that if the preload is exceeded at any moment during the test, the results will be wrong because the exceeding load will shorten the specimen and not allow for the normal expansion of the specimen.

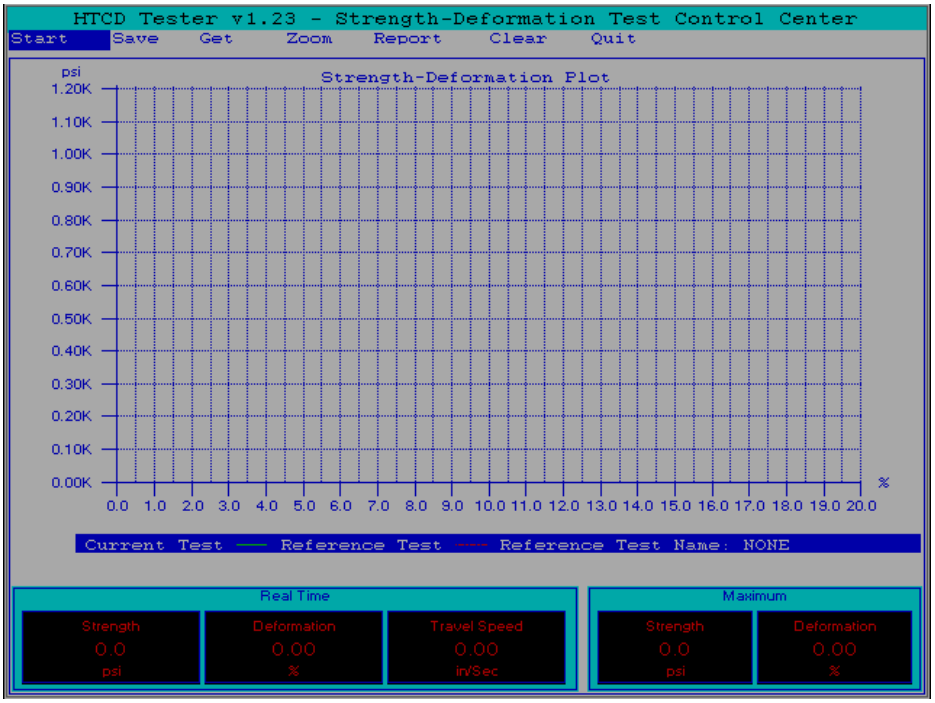
9. The test will be finished when it is no longer necessary to lower the pedestal in order to accommodate the specimen's length expansion. Press any key at this point to finish the test. The maximum values obtained of the deformation and the load (in this case the preload) are exhibited and registered.
10. Use the Lift switch to raise the furnace to the upper position and allow the sand specimen and lentils to cool for 5-10 minutes.
11. Use the other menu functions:
    - REPORT: Prints the Test.
    - REMARKS: Allows for information pertaining to the test to be entered that will then be printed with the other test data. Press enter several times until the word Ready appears in the lower right of the remarks window. Then go to report for printing.
    - CLEAR: Clear the screen for the next Test.
    - QUIT: Escapes from the current screen to the HTCD Main Screen.
12. After the options mentioned above have been selected, or not selected, use the tongs to remove the specimen that was just tested and the lentils and place into the tray that is located at the bottom of the lower pedestal for additional cooling. Do not touch the specimen or lentils for at least ½ hour. These can remain in the tray while performing other tests.

5.2.3 S&D Test (Strength and Deformation)

This test determines the load required to deform a specimen at a given temperature. The machine measures the actual values and the corresponding maximum strength. A curve is drawn and registered with all this data.

If any data is to be exported to a USB flash drive, it must be installed into the USB port on the right side of the machine prior to the machine being turned on. The drive will be recognized on.

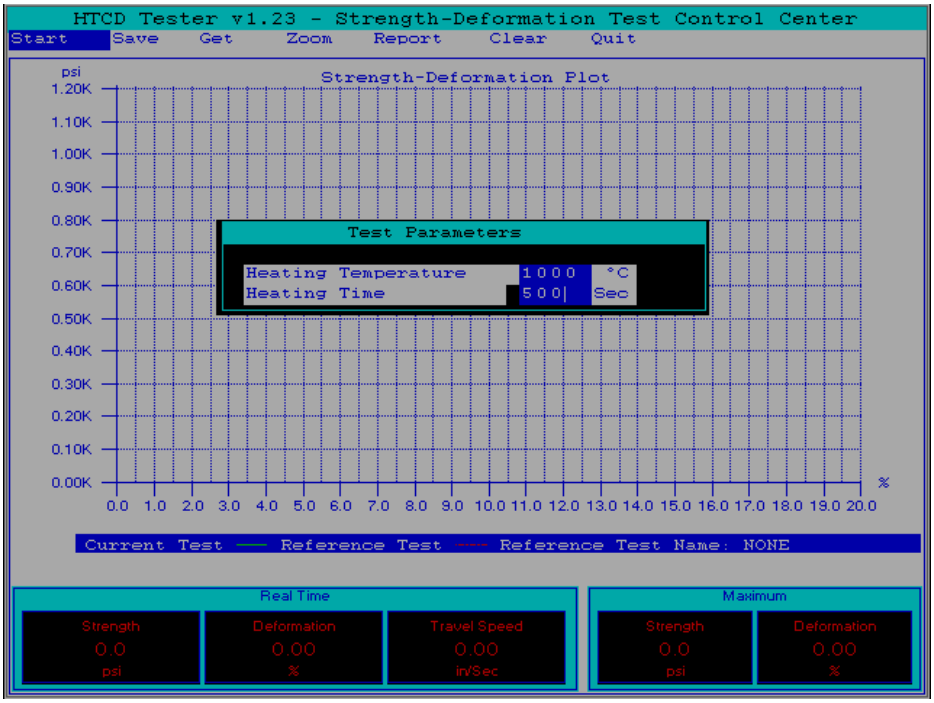
1. From the HTCD Tester Main Menu select the S&D Test by using the keyboard arrow keys and depress ENTER.
2. The HTCD Strength & Deformation Test Control Center screen will be displayed. (Screen # 3)



Screen No. 3

3. Select the START command with the arrow keys on the keyboard and press ENTER.

4. Type in the temperature in the Test Parameters window, this be the same temperature that was selected on the temperature controller. Press enter on the keyboard.



Screen No. 3A

5. Then enter in the heating time for the specimen soak time and then press the enter button on the keyboard twice. The “Test Parameters” window will be removed.

6. After reaching the desired test temperature in the furnace and a prepared specimen is ready, put the furnace in the up position by using the Lift selector switch (#3 Fig. 2) located on the front panel of the Tester.

7. A prompt on the test screen can be seen indicating the next step of the test. It is located directly above the Real Time and Maximum windows. It will read; Heating - Place probe under test, position the furnace and press any key.

BURN HAZARD! *The High Temperature Compression Tester lower and upper pedestal, always wear gloves and be cautious when working with or around the tester.* ***Hot*** *surfaces can* ***burn*** *hands and body parts.*

8. Place the specimen and quartz lentils on the lower pedestal with the tongs that are provided with the machine. There are 2 lentils to be used with the sand specimen, one has a slight curve on it and is placed on the top of the sand specimen and the other is used on the bottom of the sand specimen and is in direct contact with the lower post.

9. Raise the lower pedestal, with the specimen and lentils (probe) on it, using the manual command pushbuttons 9 or 11 until there is a 1 - 2 mm clearance between the upper lentil and the upper pedestal. (See Fig. 3).

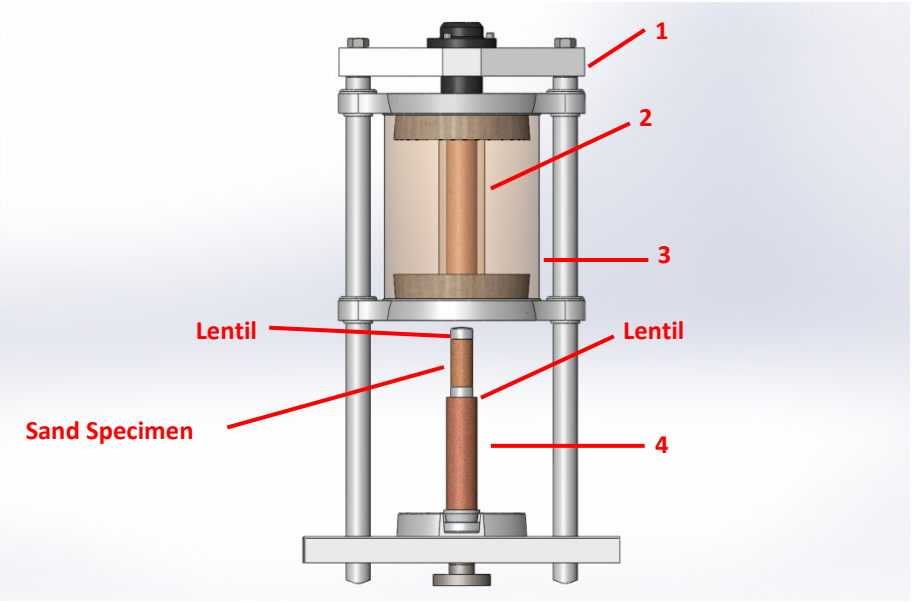


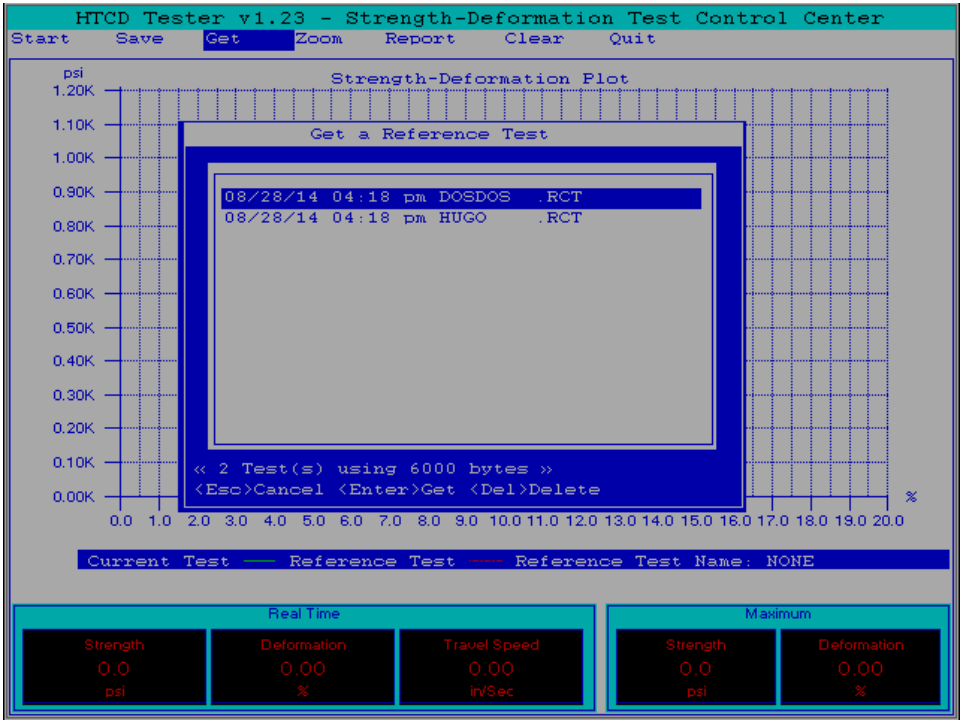
Figure No. 3

10. Lower the furnace using the Lift selector switch (#3 Fig. 2) Down position. See Figure No. 3A.
11. Start the test by pressing the any key on the keyboard.
12. A new prompt appears on the screen and indicate: Heating in progress - Time to go (xxx) seconds.
13. When the soaking time is finished, the automatic application of load begins. When the load exceeds the PRE-LOAD set in SET-UP, the machine will zero all meters and start plotting on the graph. The load will also begin displaying data in the windows located in the lower left part of the screen. The actual time and the maximum load are displayed at the lower right. The start of the test will be indicated by a prompt on the screen; Test in progress.

14. After the maximum load is reached the load will begin to track downward and when load value is 1/3 of the maximum the test will be complete. The descent valve acts automatically for 5 seconds to reposition the lower pedestal
15. Once the test is complete a new prompt will appear and state; Test Over-Repositioning.
16. Use the other menu functions; SAVE, GET, ZOOM, REPORT (print), CLEAR (clear data in the test windows) and QUIT (leave the Strength & Deformation Test), as necessary to carry on any further testing or to print the information.
17. After the options mentioned above have been selected, or not selected, use the tongs to remove the specimen that was just tested and the lentils and place into the tray that is located at the bottom of the lower pedestal for additional cooling. Do not touch the specimen or lentils for at least ½ hour. These can remain in the tray while performing other tests.

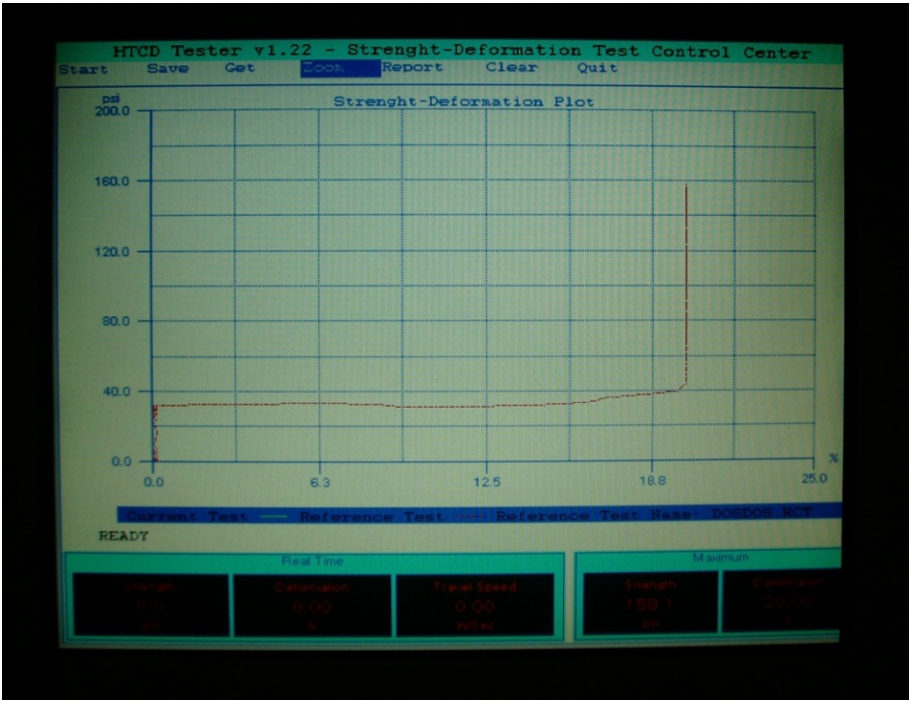
18. A brief description of the menu functions are listed below:

- SAVE. Stores the data in the Hard Drive.
- GET. With this command any previously stored curve can be retrieved. (See Screen 3B)

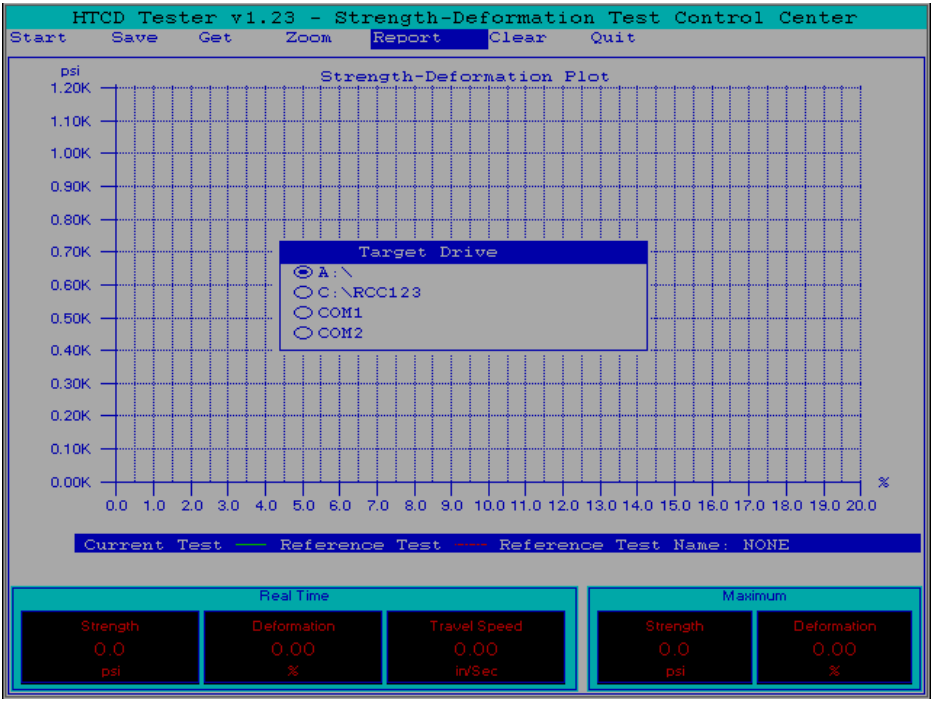


Screen No. 3B

ZOOM. This function is used to magnify the curve on the screen.

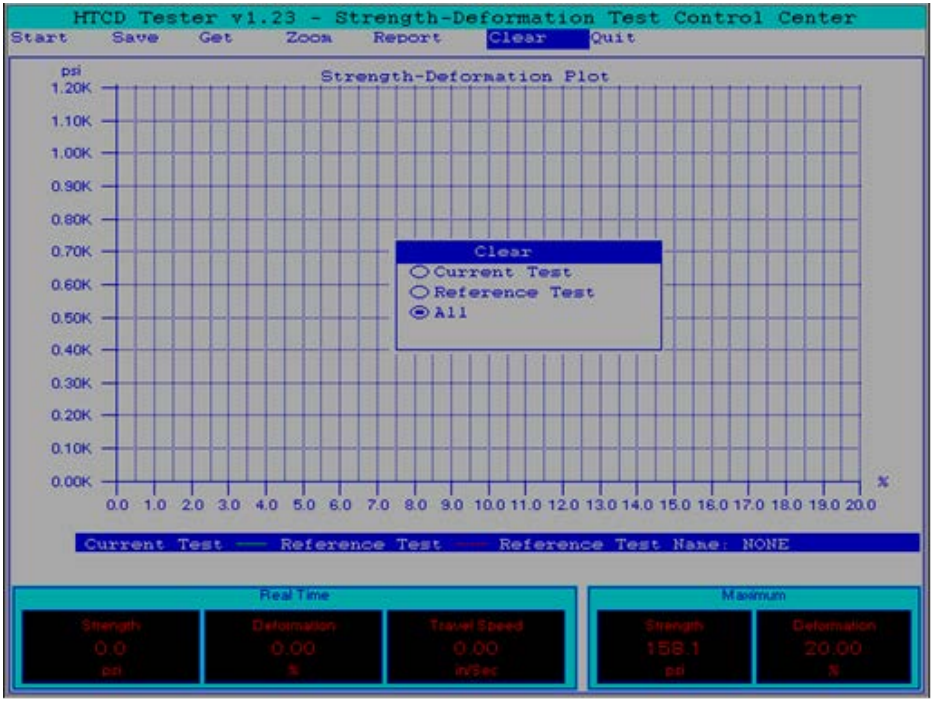

HTCD Tester v1.22 - Strenght-Deformation Test Control Center
Start
Save
Get
Zoom
Report
Clear
Quit
Strenght-Deformation Plot
psi
200.0
160.0
120.0
80.0
40.0
0.0
0.0
6.3
12.5
18.8
25.0
%
Current Test
Reference Test
Reference Test Name: DOSDOS.RCT
READY
Real Time
Maximum

Screen 3C



Screen 3D & 3E

CLEAR: This command will remove the results from a current test or reference test curve. Both current data and reference test curves can be removed simultaneously.



Screen 3F

QUIT: To move from the present screen and return to the Main Menu screen.

6 Maintenance and Calibration

For more information on how to use and care for your Simpson Analytics equipment and accessories visit our Simpson Technologies channel on YouTube and search our library of videos. Subscribe to our channel to keep updated on new releases.

Before performing any maintenance, turn off the Lock-Out air supply valve, remove the electrical power cord from the wall receptacle and allow the Furnace to cool off to ambient temperature. The High Temperature Compression Tester must be put into Zero Mechanical State (ZMS). Follow Lockout and Tagout procedures before servicing.

6.1 Maintenance

1. Daily, remove any loose sand/dirt from the High Temperature Compression Tester and its surroundings.
2. Clean the keyboard periodically.
3. Check the Air Line Filter weekly and remove if present the water from the filter vase.
4. Every two years open the cooling tank and remove four gallons of oil into a clean container, clean the cooling tank and pour back the oil previously removed and add approximately one gallon of turbine oil ISO grade 22 (SAE 5 W).

6.2 Calibration

When the tester is due for recalibration, a warning message will appear. It is recommended that the machine be checked a minimum of once a year, but a quarterly check will help to maintain the machine for more accurate results.

A Mechanical Load Cell is required to perform this calibration and is NOT included with the High Temperature Compression Tester.

The mechanical load cell part no. 0042125 that is used for this procedure can be purchased from Simpson Technologies Corp.

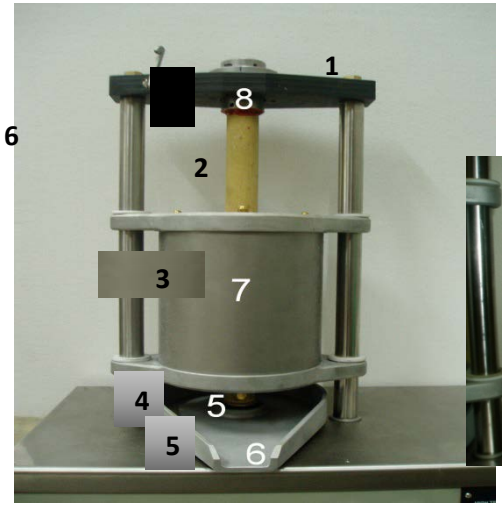


Figure No. 4

Figure No. 5

1	Crossbar
2	Upper Pedestal
3	Furnace
4	Lower Pedestal
5	Speciment Tray
6	Furnace Guide Rod
7	Calibration Pedestal
8	Calibration Cap
9	Mechanical Load Cell

To perform the Force Calibration you must remove the Crossbar and the Upper Pedestal (#1 & #2 Fig. 4)

1. Procedure to remove the Upper Pedestal and install the Calibration Pedestal.
    - Remove the two bolts that secure the Crossbar (#1) to the Furnace Guide Rods (#6), see Fig. 4.
    - Carefully remove the Crossbar with the Upper Pedestal (#2 Fig. 5.) from the Furnace Guide Rods. Remove the hardware holding the Upper Pedestal to the Crossbar and separate the two pieces.
    - Install the Calibration Pedestal (#7 Fig. 5) into the Crossbar and reattach the hardware previously removed securing the Calibration Pedestal to the Crossbar.
    - Carefully reinstall the Crossbar with the Calibration Pedestal into the two Furnace Guide Rods and secured it with the two bolts previously removed. See Fig. 6.
2. Raise the Furnace using the UP position on the Lift selector switch. See Item #3 Fig. 2.

Figure No. 6.

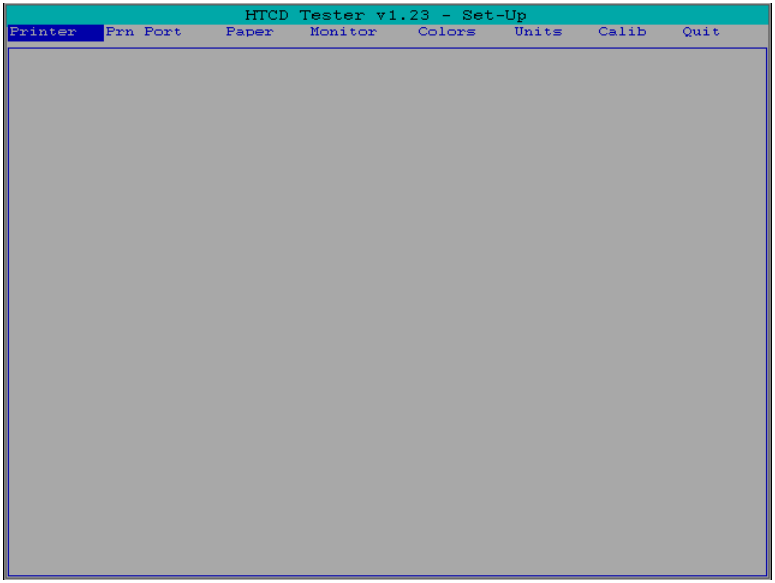
Figure No. 7

3. Install the Calibration Cap (#8 Fig. 7) onto the Lower Pedestal (#4 Fig. 7).
4. Install the Mechanical Load Cell (#9 Fig. 8) part no. 0042125 between the Upper Pedestal and the Calibration Cap.

5. Refer to the “Certification of Calibration - Mechanical Load Cell No. 42125” page 3, Calibration Summary chart, Deflection .01mm column - line 2.

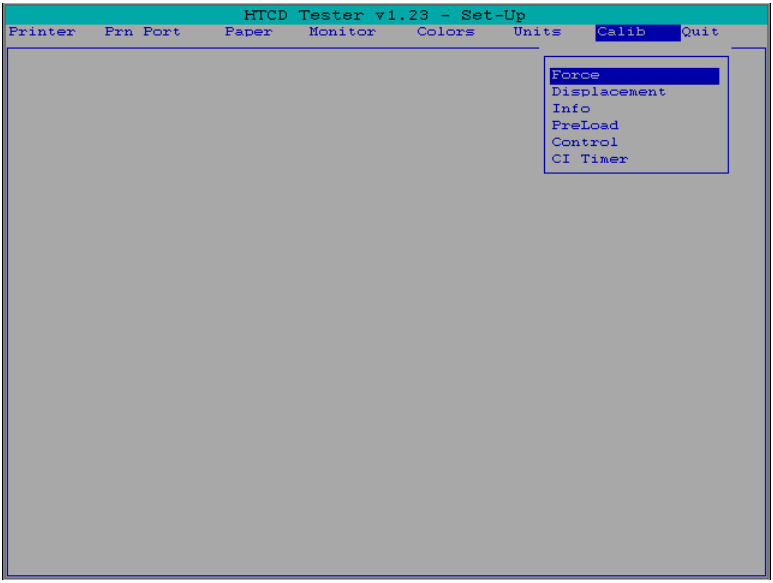
Figure No. 8

6. From the HTCD Main Menu screen (#1) select Set-Up and depress ENTER; the Set-Up screen No. 4 is displayed.



Screen No. 4

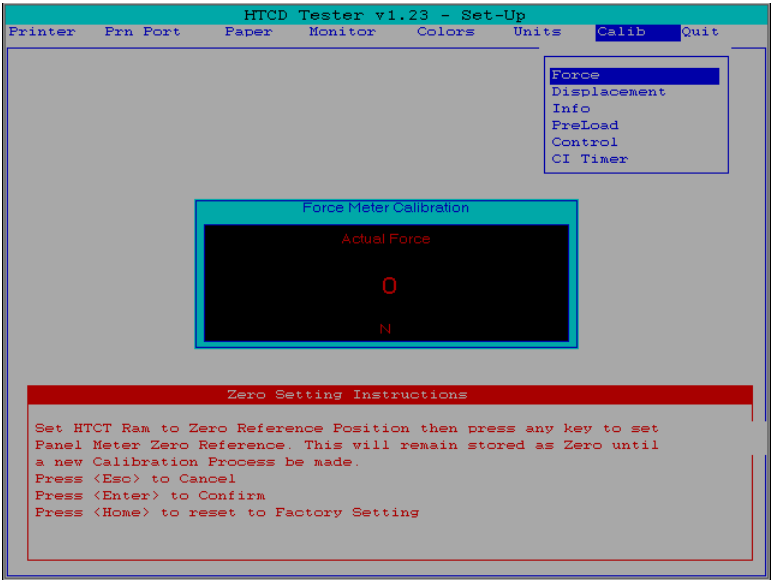
7. On the Set-Up screen select CALIB and depress ENTER; the screen now shows the different calibration procedures (screen #5). Choose FORCE and depress ENTER and the screen will show the instructions for Force Calibration.



Screen No. 5

8. Set the HTCD Ram to Zero Reference Position (5 mm from the lower position) then press any key to set Panel Meter to Zero Reference. This function will be stored as Zero until a new calibration process is made (see screen No. 6). Depress ENTER to confirm or:

   - Press <Esc> to cancel.
   - Press <Home> to reset to factory setting.



Screen No. 6

9. After depressing the enter key, the legend SPAN SETTING INSTRUCTIONS and the following instructions are displayed.

Now place the proper reference source (mechanical load cell, part number 42125) in position and apply load until the Panel Meter reading matches the Reference Source reading using the following keys:

<Up Arrow>	increments reading slowly (fine adj.)
<Dn Arrow>	decrements reading slowly
<Pg Up>	increments reading faster (coarse adj.)
<Pg Dn>	decrements reading faster
<Home>	resets to factory setting
<Enter>	done
<Esc>	abort (keep current setting)

6.2.1 Displacement Calibration

A Dial Indicator Gauge is required for this procedure and is supplied with the High Temperature Tester.

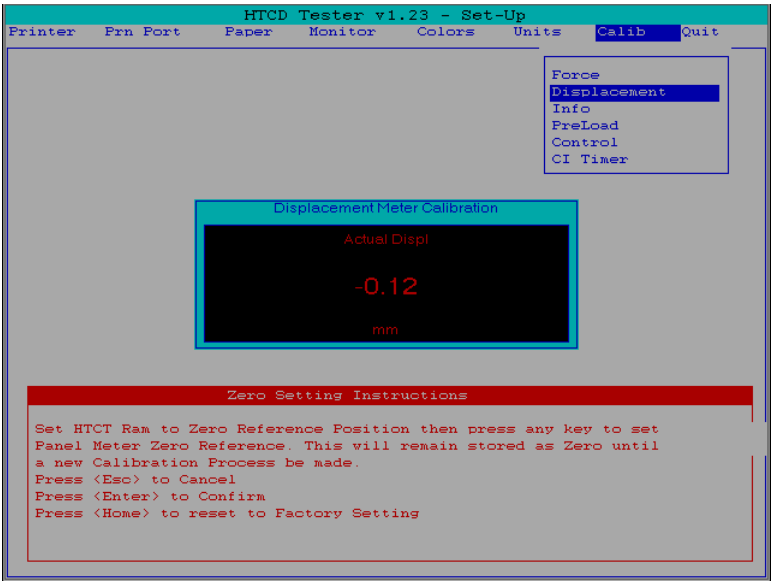
1. Assemble the Dial Indicator Gauge as shown in Fig. 9 and adjust the gauge to zero.

Figure No. 9

2. On the Set-Up screen CALIB mode choose DISPLACEMENT and depress ENTER and the screen will show the instructions for Displacement Calibration.
3. Set the HTCD Ram to Zero Reference Position, and then press any key to set Panel Meter to Zero Reference. This function will be stored as Zero until a new calibration process is made (see screen No. 7). Depress ENTER to confirm or:

Press <Esc> to cancel.

Press <Home> to reset to factory setting.



Screen No. 7

4. After proceeding through the instructions, the legend SPAN SETTING INSTRUCTION will appear. Place the proper Reference Source in position (dial indicator, magnetic base), move the post up with the pushbutton (9) on the front panel of the equipment and match the Panel Meter reading to the Reference Source reading using the following keys:

<Up Arrow>	increments reading slowly (fine adj.)
<Dn Arrow>	decrements reading slowly
<Pg Up>	increments reading faster (coarse adj.)
<Pg Dn>	decrements reading faster
<Home>	resets to factory setting
<Enter>	done
<Esc>	abort (keep current setting)

7 Parts List / Ordering Parts / Returns

7.1 Spare Parts List

Simpson maintains a large inventory of common spare parts for all current Simpson Analytics products. The following table provides part numbers for common spare parts for this device. Contact Simpson Technologies with the part number and description when ordering

Part No.	Description
207610	Stainless Steel Lentils - AFS
207609	Quartz Lentil - Metric
207611	Silicone Carbide Lower Post
0030-131	Silicone Carbide Upper Post
207610	Stainless Steel Lentils - AFS
207609	Quartz Lentil - Metric

7.2 Ordering Replacement / Spare Parts

The source of replacement parts for your Simpson Analytics equipment is just as important as the make of the equipment you purchase. ALWAYS order parts for your Simpson Analytics equipment directly from Simpson Technologies. To find the Simpson office closest to you please visit us on the internet at simpsongroup.com on the "Contact Us" page.

Parts may be ordered from the sales department via e-mail at parts@simpsongroup.com: When contacting our sales department to obtain a quotation on replacement parts or service please always include the equipment serial number, the description of the part and the part number. Your Simpson Technologies sales team representative will provide you with a quote on the items with current price and delivery times. When ordering, please always refer to the quote number on your order.

To arrange for calibration support or repair assistance please contact our customer service department at service@simpsongroup.com.

7.3 Returned Goods Policy

Simpson Technologies strives to provide their customers with maximum follow-up support and, in order to offer the most practical flexibility; the following conditions apply to returned goods. Adherence to these procedures will assure the most prompt and efficient service.

RETURNS WILL BE CONSIDERED IN THE FOLLOWING SITUATIONS:

- Products ordered in error by customer (subject to a restocking charge).
- Incorrect or defective products shipped to customer.
- The return of existing products for factory repair or upgrade.
- Products ordered correctly but which are unwanted or unsuitable (subject to a restocking charge).
- A Safety Data Sheet (SDS) must accompany material that is sent to Simpson Technologies for testing purposes. Simpson Technologies will NOT authorize the return of hazardous materials.

RETURN PROCEDURE:

- **Customer must obtain a Return Goods Authorization Number (RGA#) from Simpson Technologies prior to returning the merchandise.**
- The customer must obtain a Return Material Authorization Number (RMA#) from Simpson Technologies prior to returning the goods.
- To obtain an RMA#, the customer should contact the Customer Service department by phone, e-mail to service@simpsongroup.com. The material being returned must be identified and the reason for its return clearly specified. Once approved for return, Simpson Technologies will issue the customer an RMA form to be included with the shipment and with instructions on where and how to ship the goods.
- All returned goods are to be shipped with transportation charges PREPAID, unless otherwise agreed when the RMA# is assigned. If it has been predetermined that return goods are to be shipped COLLECT, Simpson Technologies will specify the desired routing.
- All returned shipments will be subject to inspection upon arrival at Simpson Technologies.

Material returned without an RMA# may be refused and returned at customer's expense.

8 Decommissioning

Before doing any work, review the Safety Procedures in Section 2 and Lockout and Tagout all the power sources to the machine and peripheral equipment.

Failure to follow safety procedures could result in serious injury.

Use qualified personnel and follow safety procedures, applicable local policies, and regulations in decommissioning the High Temperature Compression Tester and peripheral equipment.

Electrical Power: Disconnect the electrical power source and verify there is no power on all components being decommissioned.

: Shut-off all plant airlines supplying air to the pneumatic components and bleed the downstream air lines before dismantling.

WASTE DISPOSAL

The **This Page is Intentionally Blank** machinery and controls consists of:

- Iron
- Aluminum
- Copper
- Plastic

Dispose of the parts in accordance with the applicable regulations.

SIMPSON
A Norican Technology

This Page is Intentionally Blank

In North America

Simpson Technologies

2135 City Gate Lane Suite 500

Naperville, IL 60563

USA

Tel: +1 (630) 978 0044

sandtesting@simpsongroup.com

In Europe

Simpson Technologies GmbH

Thomas-Eßer-Str. 86

D - 53879 Euskirchen,

Germany

Tel: +49 (0) 2251 9460 12

sandtesting@simpsongroup.com

SIMPSON

A Norican Technology

simpsongroup.com