SIMPSON
A Norican Technology

Operating Instructions

Electronic Universal Sand Strength Machine

Model 42104

Accessories:	Model
Cold Tensile Strength Accessory	42104C
Splitting Strength Accessory	42104D
Green Deformation Accessory	42104E
Hot Shell Tensile Accessory	24104F
High Compression Strength Accessory	42104H
Core Transverse Strength Accessory	42104K
Shell Transverse Strength Accessory	42104L
Cold Shell Tensile Strength Accessory	42104N
Disk Transverse Accessory	42104P
MOR Bar Test Fixture Accessory	211219

Type:	Electronic Universal Sand Strength Machine
Model:	42104
Part No.:	0042104-ASM 0042104-M-ASM
Serial Number:	

Name and address of manufacturer:

Simpson Technologies
2135 CityGate 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 www.simpsongroup.com on the Contacts page.

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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 Electronic Universal Sand Strength Machine should be operated only when it is in perfect condition, in accordance with its designed purpose and being aware of possible hazards. Observe the safety instructions in Section 2 and operating instructions in Section 5.

1.1 Application and Designated Use

The Electronic Universal Sand Strength Machine, Model 42104, is intended exclusively for measuring the strength of foundry sands mixed with chemical and clay binders. Usage of other materials may be possible upon consultation with the Service department of Simpson Technologies (service@simpsongroup.com).

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 be 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 without 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.

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 symbols into the hazard severity panels 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 injury.

NOTICE indicates information used to address practices not related to personal injuries but may result 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

ELECTRICAL SHOCK / ELECTROCUTION
(STC #214043)

This label is located on the lower right hand of the cabinet.

When the front electrical panel is removed, electrical terminals are exposed. A hazardous voltage is present, can cause electric **shock** or **burn**, and will result in serious injury. Follow **Lockout and Tagout** procedures before servicing.

ELECTRICAL SHOCK / ELECTROCUTION
(STC #217958)

This label is located on the back panel above the electrical cord connecting inlet.

With the back or bottom panels removed, the electrical power supply and electrical terminals are exposed. A hazardous voltage is present, can cause electric shock or burn and will result in serious injury. Follow Lockout and Tagout procedures before servicing.

EXPLOSION / RELEASE OF PRESSURE
(STC #217945)

This label is located on the back panel 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.

HAND CRUSH / FORCE FROM LEFT (STC #214047)

This label is located on the right side of the cabinet by the Clamp Arm.

When installing the Transverse Accessories with the power ON, it is possible to accidently press the Start button causing the Clamp Arm to travel and possibly pin your hand/fingers between the Transverse Accessory and the Stationary Clamp Holder, which may crush or cut body parts. Turn OFF the machine *every time* any transverse accessory is installed on the Electronic Universal Sand Strength Machine, Model 42104. Follow Lockout and Tagout procedures before servicing.

READ AND UNDERSTAND ALL SERVICE MANUAL INSTRUCTIONS (STC #214042)

This label is located on the lower right hand of the cabinet.

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. All protective guards and covers shall be installed, and all doors closed before operating the equipment. If any questions exist, you must contact your supervisor or Simpson Technologies before taking further action. Follow Lockout and Tagout procedures before servicing

2.2 Lockout and Tagout System Procedure

NOTICE

Whenever performing any type of maintenance or repair, whether in the form of cleaning, inspection, adjustment, mechanical or electrical 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, electrically, through hydraulics, pneumatics, levers, gravity or otherwise; and a listing of the established lockout procedures posted on each piece of 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.

2.2.1 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 operated until the tagout device is removed.

2.2.2 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 controlled 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 controlled 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 Application

The Electronic Universal Sand Strength Machine, Model 42104, is used to determine the strength properties of clay and/or chemically bonded foundry sand specimens. A horizontally moving arm applies pressure on a sand specimen until failure. After the maximum force is reached the machine resets the moving clamp arm to home position. The force data is clearly displayed on a digital display.

When testing green compression strength, the sand specimen is not crushed because the strength machine automatically stops loading the sand specimen at the maximum force. This design feature keeps the test area clean and allows the operator to accurately measure the molding sands green deformation at maximum strength, using the Green Deformation Accessory, Model 42104E. A molding sands deformation characteristic is associated with the sands plasticity.

3.2 Description

The Electronic Universal Sand Strength Machine, Model 42104, is capable of running many different sand strength tests with additional fixtures and accessories that are easy to connect to the instrument. These tests include green and dry compression strength, green and dry shear strength, splitting strength, green deformation at maximum strength, high compression strength, hot shell tensile strength, cold shell tensile and transverse strengths, disc transverse strength, core tensile and transverse strengths, and hot box tensile strength.

After placing the sand specimen in the strength accessory, the operator only needs to choose the correct test selection option and press the start button. The five-digit digital display shows the strength value of the molding sand specimen, in N/cm^2 or PSI, depending on the operator's preference. The design of the strength machine incorporates digital calibration that can be completed in minutes and only requires the Mechanical Load Cell, Model 42125, (sold separately). The Universal Sand Strength Machine is shipped with the accessories required to test green and dry compression strength and shear strength of clay bonded foundry molding sand.

When testing green compression and shear strengths, the Electronic Universal Sand Strength Machine measures the force needed to reach the point of maximum strength. Maximum strength is defined at the point just before sand specimen destruction. Maximum strength is shown at point 1 on an example of a typical stress strain curve generated from a clay bonded molding sand (Figure 3.2.1). This advanced feature is unlike older mechanical type strength machines which continue to apply load and measure sample resistance beyond maximum strength. By continuously sensing strength and automatically stopping load application at the exact point of maximum strength, the instrument obtains much more accurate and repeatable results.

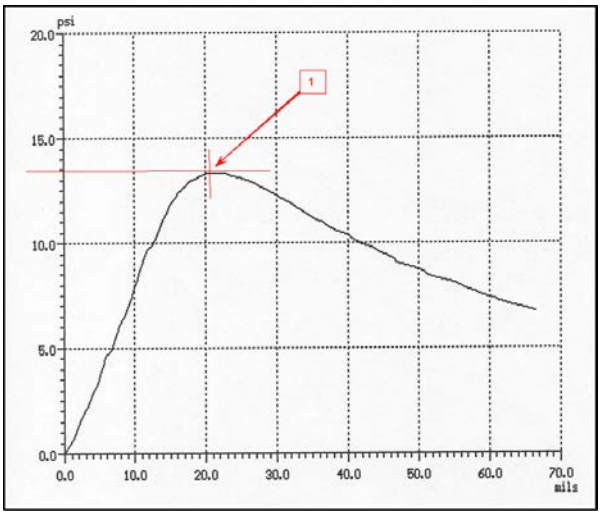


Figure 3.2.1: Example of a typical stress strain curve generated from a clay bonded molding sand specimen during a green compression strength test.

The ability to accurately measure green deformation at maximum strength is another advantage of stopping the application of load to the sand specimen at maximum strength. Ease of measuring green deformation is an advantage of not destroying the sand specimen. By utilizing the Green Deformation Accessory, Model 42104E, deformation data can be obtained by tracking sand specimen length prior to starting the compression strength test and after reaching maximum strength at the completion of the strength test. Too little green deformation would be considered a brittle sand and subjective to broken molds, stickers and trouble pulling deep pockets on difficult patterns**.**

3.3 Specifications, Dimensions and Weights (Approximate)

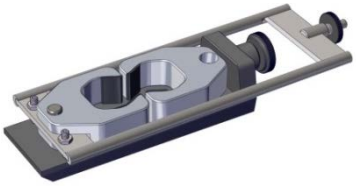
Specifications	Electronic Universal Sand Strength Machine
Length	457 mm (18 in.)
Width	305 mm (12 in.)
Height	305 mm (12 in.)
Weight	30 kg (66 lbs.)
Power	Standard - 100-240 V, 50-60 Hz
Compressed Air	5 to 6 bar (72-87 psi)
Load Cell Capacity	500 kgs. (1,102 lbs.)

Load Capacity		
Test Selection	**AFS**	**Metric**
Force	970 Lbs.	4316 N
Compression Strength	309 psi	220 N/cm^2
Shear Strength	243 psi	173 N/cm^2
Core Tensile Strength	970 psi	862 N/cm^2
Shell Cold Tensile Strength	3880 psi	2874 N/cm^2
Shell Hot Tensile Strength	3880 psi	2874 N/cm^2
Core Transverse Strength	8730 psi	8640 N/cm^2

3.4 Accessories

3.4.1 Cold Tensile Strength Accessory (Model 42104C)

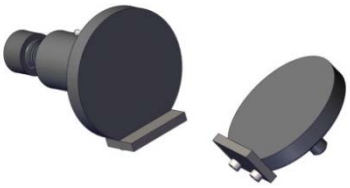
This accessory is mounted on the Electronic Universal Sand Strength Machine (Model 42104). The test determines the cold tensile strength of standard dog bone specimens prepared from oil, cold box, hot box and air set sands (no-bake).



Specifications	Cold Tensile Strength Accessory
Length	ca. 83 mm (3.25”)
Width	ca. 32 mm (1.25”)
Height	ca. 229 mm (9”)
Weight	ca. 1.5 kg (3.3 lb.)

3.4.2 Splitting Strength Accessory (Model 42104D)

This accessory which mounts on the Electronic Universal Sand Strength Machine, Model 42104, is used to determine the splitting strength of clay bonded molding sands. A standard 2" x 2" AFS sand specimen (50 mm x 50 mm metric) is placed between two testing clamps with its radial surface against the face of each clamp. When the sand specimen is compressed through its diameter, a split is formed along its horizontal axis. The splitting strength test is considered an indirect measurement of a molding sands tensile strength property.



Specifications	Splitting Strength Accessory
Length	ca. 64 mm (2.5”)
Width	ca. 64 mm (2.5”)
Height	ca. 51 mm (2”)
Weight	ca. 0.3 kg (.65 lbs.)

3.4.3 Green Deformation Accessory (Model 42104E)

This accessory measures the deformation of the green sand specimen after a compression test on the Electronic Universal Sand Strength Machine, Model 42104. Deformation is the change in the length of the sand specimen before and after the compression test. Deformation measurements indicate the plastic characteristics of a molding sand.

Specifications	Green Deformation Accessory
Length	ca. 70 mm (2.75”)
Width	ca. 102 mm (4”)
Height	ca. 203 mm (8”)
Weight	ca. 1.8 kg (4 lbs.)

3.4.4 Hot Shell Tensile Accessory (Model 42104F)

This accessory to the Electronic Universal Sand Strength Machine, Model 42104, is used to measure the hot tensile strength of shell sands. The unit has both mechanical and electrical connections to the strength machine. Using the control cabinet, the operator sets the desired testing time and temperature. The heated core box is manually filled with sand. At the proper dwell time, the strength machine automatically breaks the specimen. The hot tensile strength results are shown on the five-digit display of the strength machine. The Hot Shell Tensile Accessory includes the temperature and timer control cabinet, upper and lower heating block assembly, sand specimen tooling, tooling bridge, sand scoop/strike-off and magnetic tooling extraction device.

Specifications	Hot Shell Tensile Accessory
Length	ca. 400mm (15.75”)
Width	ca. 305mm (12”)
Height	ca. 305mm (12”)
Weight	ca. 8.2 kg (18 lbs.)

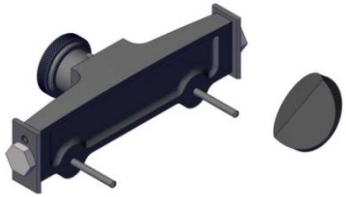
3.4.5 High Compression Strength Accessory (Model 42104H)

This accessory is used with the Electronic Universal Sand Strength Machine, Model 42104. It increases the force in a compression test up to a strength of 2100N/cm^2 (3100 psi).

Specifications	High Compression Strength Accessory
Length	ca. 254 mm (10”)
Width	ca. 127 mm (5”)
Height	ca. 203 mm (8”)
Weight	ca. 10 kg (22 lbs.)

3.4.6 Core Transverse Strength Accessory (Model 42104K)

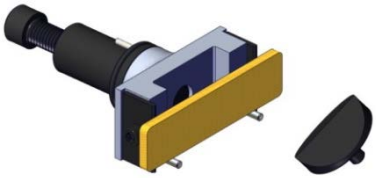
This accessory attaches to the Electronic Universal Sand Strength Machine, Model 42104, and holds the standard core sand transverse sand specimens for transverse strength testing.



Specifications	42104K-M/42104K
Length	ca. 162 mm (6.5”)
Width	ca. 64 mm (2.5”)
Height	ca. 89 mm (3.5”)
Weight	ca. 1.5 kg (3.3 lbs.)

3.4.7 Shell Transverse Strength Accessory (Model 42104L)

This accessory, attached to the Electronic Universal Sand Strength Machine, Model 42104, breaks shell transverse specimens. The accessory is designed to hold the AFS standard ¼" (6 mm metric standard) thick transverse sand specimen for transverse strength testing.



Specifications	Shell Transverse Strength Accessory
Length	ca. 89 mm (3.5”)
Width	ca. 38 mm (1.5”)
Height	ca. 102 mm (4”)
Weight	ca. 1.5 kg (3.3 lbs.)

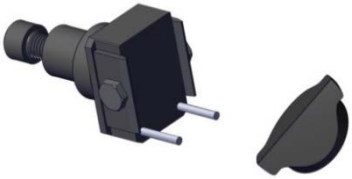
3.4.8 Cold Shell Tensile Strength Accessory (Model 42104N)

This accessory to the Electronic Universal Sand Strength Machine, Model 42104, determines the cold shell tensile strength of an AFS standard ¼" (7.83 mm metric standard) thick dog bone specimen. It mounts mechanically to the arm and load cell of the strength machine.

Specifications	Cold Shell Tensile Strength Accessory
Length	ca. 254 mm (10”)
Width	ca. 102 mm (4”)
Height	ca. 64 mm (2.5”)
Weight	ca. 2 kg (4.4 lbs.)

3.4.9 Disk Transverse Accessory (Model 42104P)

This accessory to the Electronic Universal Sand Strength Machine, Model 42104, breaks disk transverse sand specimens. It includes attachments for the moving clamp holder and stationary clamp holder. The attachments mount mechanically to the moving and stationary clamp holders of the strength machine.



Specifications	Disk Transverse Accessory
Length	ca. 254 mm (10”)
Width	ca. 127 mm (5”)
Height	ca. 203 mm (8”)
Weight	ca. 1.5 kg (3.3 lbs.)

3.4.10 MOR Bar Test Fixture Accessory

The MOR Bar Test Accessory is attached to the Electronic Universal Sand Strength Machine, Model 42104, and is used to measure the maximum transverse strength of investment casting MOR bar specimens in a four-point bend.

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 Electronic Universal Sand Strength Machine, Model 42104, is shipped in one piece and is intended to be used as received; no further assembly/ disassembly is required. No lifting equipment is required for handling. The machine weighs approximately 30 kg (66 lbs.). Due to its bulky dimensions and tight-fitting shipping crate, it is recommended that two people remove the equipment from the crate. Whenever positioning or relocating this instrument, two people should be utilized. The approximate instrument dimensions are 457 mm (18") x 305 mm (12") x 305 mm (12"). Its shipping weight (in a crate) is 34 kg (75 lbs.).

ONLY authorized personnel may unload and install this equipment. Two people may be required to unpack this instrument due to the bulky dimensions and tight-fitting packing crate.

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 tester from the packing crate and place it on stable bench.
3. Once removed from the crate, proceed by taking off any protective wrap and unpackage 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 Electronic Universal Sand Strength Machine is shipped with the following accessories and installation components. Please take a moment to identify that the following items were included:

- Electronic Universal Sand Strength Machine.
- Operating Instructions Manual.
- Pneumatic Tubing - approximately 1m (3').
- Pneumatic regulator/filter/lubricator.
- Assembly and instruction manual for pneumatic regulator/filter/lubricator.
- Pneumatic fitting to connect pneumatic tubing to the pneumatic regulator/filter/lubricator.
- Power cord.
- Set green compression clamps.
- Set green shear clamps.
- Adjustable clamp holder.

If any of the above components or literature is missing, call your local Simpson Technologies office.

The following equipment and material are required for proper installation, but NOT supplied with the Electronic Universal Sand Strength Machine:

- Surge/voltage spike protector.
- ⅛" pipe adapter to connect supplied pneumatic regulator/filter/ lubricator to plant air system.

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.

It is recommended that the strength machine be situated close to the sand rammer or pneumatic sand squeezer.

Place the strength machine on a stable bench. Although it is not required that the machine is perfectly level in order to operate, it should be in a level condition. Place a bubble level on top of the machine housing and level the machine using the four adjustable feet located at each bottom corner of the strength machine. Check level from side to side and front to back.

The strength machine would likely be occupied by one operator at a time. It is used in a foundry sand laboratory, with its operation display and control buttons placed at about eye level for the operator. It should be placed in an ergonomically correct position to allow the operator to comfortably handle the sand sample as well as the control buttons.

4.4 Electrical and Pneumatic Power Connection

Electrical Requirements: 100-240 Volts, 50-60 Hz + Ground (5Ω or less).

Connect the equipment to a grounded electrical outlet.

Pneumatic Requirements: Compressed air that is filtered and regulated between 5 to 6 bar (72 psi to 87 psi)

Before connecting the equipment, an approved pneumatic safety Lock-Out air valve must be installed in the supply air line. This item is not supplied with the Electronic Universal Sand Strength Machine and is the responsibility of the customer to provide and install.

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.

A pressure regulator/filter and length of pneumatic hose required to connect the Electronic Universal Sand Strength Machine to the regulator/filter has been included with the Electronic Universal Sand Strength Machine.

NOTICE

The compressed air should be free of dirt, debris, and condensate. Debris and condensate will cause damage to the Electronic Universal Sand Strength Machine.

NOTICE

Do not operate the Electronic Universal Sand Strength Machine without first filling the pneumatic lubricator with standard pneumatic tool oil/lubricant and setting the proper oil addition rate on the pneumatic lubricator. Failure to properly set up the pneumatic lubricator will result in erratic operation and will prematurely destroy the cylinder seal kit and potentially damage the cylinder.

4.5 Connecting Power and Set-Up

1. Verify the voltage on the specification plate located on the back of the Electronic Universal Sand Strength Machine. Connect the power cable supplied with the tester into the power plug receptacle located on the back of the Electronic Universal Sand Strength Machine (Figure 7.1, Item 3).

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

2. Verify the proper voltage of the electrical outlet before plugging the power cord into the outlet. Connect power cord to the AC electrical outlet that is free of disturbances/fluctuation and is properly grounded.

NOTICE

It is highly recommended that a voltage stabilizer/filter (line conditioner) is installed between the electrical outlet and the inlet of the Electronic Universal Sand Strength Machine. This device will help to ensure the proper performance of the Electronic Universal Sand Strength Machine.

3. Assemble the provided pneumatic regulator/filter/lubricator according to the original equipment manufacturer's instructions supplied with the regulator/filter/lubricator.
4. Connect the assembled pneumatic regulator/filter/lubricator to the incoming compressed air line.
5. Remove the plastic shipping cap from the vent (Figure 7.1, Item 6) on the back of the strength machine.

NOTICE *Failure to remove this plastic cap will cause the strength machine to malfunction.*

6. Connect the Electronic Universal Sand Strength Machine to the pneumatic regulator/filter/lubricator using the pneumatic air hose and fittings included with the unit. Connect the air hose from the outlet of the regulator/filter/lubricator to the air inlet (Figure 7.1, Item 5) located on the back side of the Electronic Universal Sand Strength Machine. Secure the air hose to the air inlet with the provided connector that is attached to the air inlet. Fill the supplied pneumatic lubricator reservoir with pneumatic tool lubricant. Refer to the manufacturer's manual for detailed instructions.
7. Turn on the air supply. Using the supplied air regulator/filter/lubricator adjust the air pressure to 5 bar (70-75 PSI). Refer to the manufacturer's manual for the regulator/filter/lubricator for instructions on regulating air pressure.
8. Adjust the oil addition rate to maintain a rate of one drop of oil every three (3) to four (4) cycles of the sand strength machine. Refer to the manufacturer's manual for the air regulator/filter/lubricator for instructions on adjusting the oil lubrication rate.

NOTICE *Failure to set the proper lubrication rate will cause damage to the strength machine cylinder.*

4.6 Airborne Noise Emission

Regarding airborne noise emission by the Electronic Universal Sand Strength Machine, Model 42104, there is no motor or other noise emitted by this instrument other than the click of a solenoid valve being operated. As such, 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.

5.1 Green or Dry Compression and Shear Strength Testing (Clay Bonded Molding Sands)

5.1.1 Preparing the Molding Sand Specimens for Compression and Shear Testing

The Electronic Universal Sand Strength Machine, Model 42104, requires a standard 2 in. x 2 in. AFS sand specimen or 50 mm x 50 mm metric sand specimen to test for compression or shear strength. Manufacture a standard (AFS or metric) sand specimen using a standard sand rammer or pneumatic squeezer (Simpson Model 42100, 42117 or 42160).

Detailed sand specimen preparation instructions can be found in the operation manual for the sand rammer or sand squeezer being used. Follow the step by step procedure in the operation manual to prepare the proper sand specimen.

5.1.2 Installation of Compression / Shear Strength Accessories

1. The Electronic Universal Sand Strength Machine, Model 42104, includes the required attachments to measure the compression and shear strength of molding sand. The attachments required to perform both tests are shown in Figure 5.1.1.

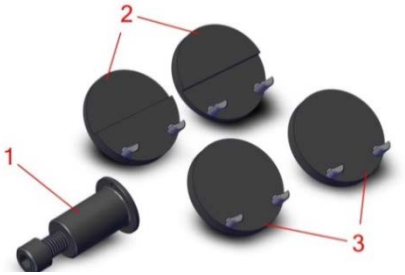


Figure 5.1.1

2. Install the adjustable clamp holder (Figure 5.1.2, Item 1) onto the moveable clamp arm of the strength machine (Figure 5.1.2, Item 5).

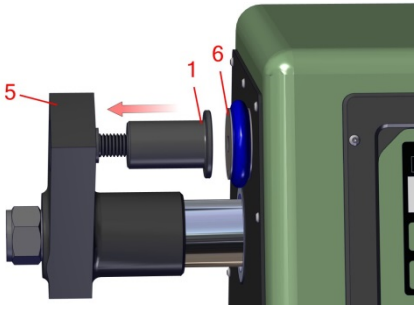


Figure 5.1.2

3. Choose either the two compression clamps or the two shear clamps. Align the pins located on the back side of the clamps with the holes located on moveable clamp arm (Figures 5.1.2, Item 5) and stationary clamp holder (Figure 5.1.2, Item 6). Gently slide the clamps onto the moveable clamp arm and stationary clamp holder.

The compression or shear clamp located on the moveable clamp arm is designed to fit into the adjustable clamp holder. The screw on the adjustable clamp holder can be rotated clockwise and counterclockwise to change the location of the compression or shear clamp mounted onto the moveable clamp arm relative to the compression/shear clamp mounted onto the stationary clamp holder. This adjustment is used when loading sand specimens onto the strength machine and closing the gap between the face of the compression/shear clamps and the sand specimen prior to starting a test.

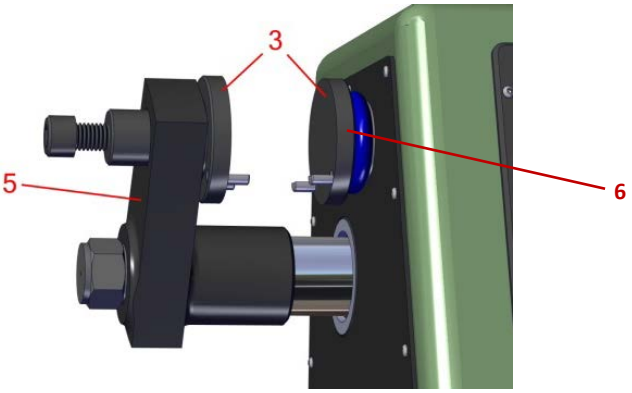


Figure 5.1.3

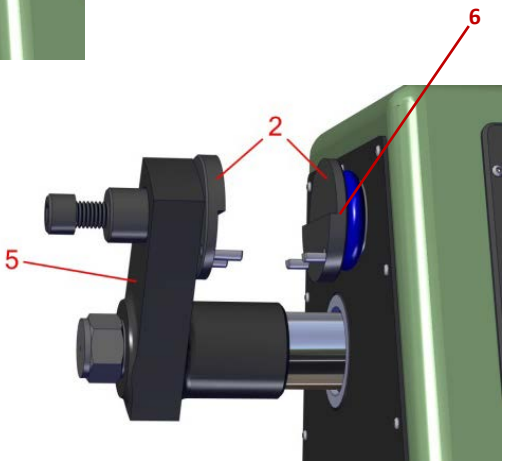


Figure 5.1.4

Refer to Figure 5.1.3. Showing detailed photos of Compression clamps properly installed on the strength machine. Refer to Figure 5.1.4 showing detailed photos of the shear clamps properly installed on the strength machine.

Item	Description
1	Adjustable Clamp Holder
2	Shear Clamps
3	Compression Clamps
5	Moveable Clamp Arm
6	Stationary Clamp Holder

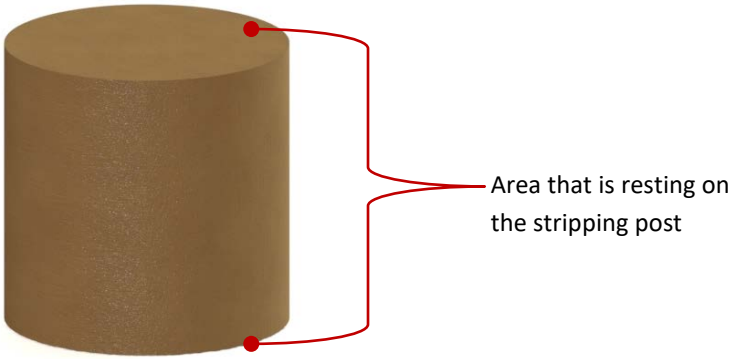
Operation

1. Turn on air supply and verify correct settings on the air regulator and oil level lubricator. Turn the power switch to the on position (Figure 7.1, Item 1). A "HELLO" message will briefly appear on the digital display. This message will be replaced by numerals.

All LED's and digital displays illuminate momentarily when the power is first turned on.

2. Press the "Test Selection" button (Figure 7.4, Item 13E) until the arrow pointing to "Compression Strength" illuminates. If running a shear strength test, then press the "Test Selection" button (Figure 7.4, Item 13E) until the arrow pointing to "Shear or Split Strength" illuminates.

3. Gently place a prepared 2" X 2" (50 mm x 50 MM) sand specimen between the compression clamps. The sand specimen should rest on the four (4) positioning pegs located on the bottom of the compression clamp accessory. The surface of the sand specimen that was resting on the stripping post should be located against the compression clamp accessory attached to the stationary clamp holder. (Figure 5.1.4, Item 6)



Specimen Sample

Always transport prepared clay bonded molding sand samples from the shop floor to sand laboratory in a sealed container to help reduce compression strength measurement variation that may occur due to water evaporation from the sand sample. Temperature of the prepared molding sand sample should be tested while transporting the sample container from the shop floor to the laboratory. Sand temperature should be recorded with compression and shear strength data. Prepared clay bonded molding sand of equal compositions with large temperature variations will result in erratic compression strength properties.

4. Using the screw on adjustable clamp holder (Figure 5.1.1, Item 1), carefully turn clockwise or counterclockwise to move the compression clamp located on the moveable clamp arm. Adjust the screw to remove any gap between the surfaces of the sand specimen and the surfaces of both the compression clamps.

NOTICE *Do not overtighten the compression clamps on the sand specimen. Adjust the distance only to close the gap between the surface of the clamps and the sand specimen.*

5. Zero the digital display by pressing the "Zero" button (Figure 7.4, Item 13C). The digital display will read zero.

6. Press the "Start" button (Figure 7.4, Item 13F). The strength machine will begin applying load to the sand specimen. It will continue to apply load until sand specimen failure. The moveable clamp arm will return to home position and the compression strength value will be displayed in the digital display. The units of measurement will be displayed in PSI or N/cm^2 as programmed by the mode of operation switch (AFS or Metric).

At the completion of the strength test, the sand specimen is not physically broken. By continuously sensing the strength measurements, the strength machine automatically stops the load application at the exact point of maximum strength. Please refer to Section 3.2 “Description” for more detailed information regarding this advanced feature of the Electronic Universal Sand Strength Machine.

7. Remove the used sand specimen from the strength machine and record the compression strength value from the digital display.

Do not run multiple compression or shear strength tests on the same sand specimen. The sand sample has been destroyed after the test.

8. Press the "Clear Display" button (Figure 7.4, Item 13D). The digital display will reset back to zero. The strength machine is ready to run another tensile test.

5.2 Cold Tensile Strength Accessory

Part No. 0042104C / 0042104C-M

5.2.1 Description

This Cold Tensile Strength Accessory is used to determine tensile strength of chemically bonded core and molding foundry sands when mounted on the Electronic Universal Strength Machine, Model 42104. Tensile strength data can be generated using the standard AFS or Metric dog bone tensile sand specimens.

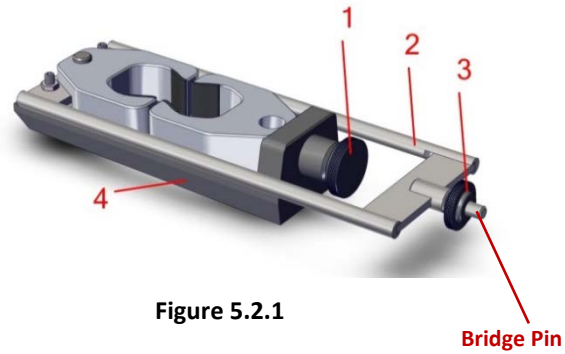


Figure 5.2.1

5.2.2 Installation

1. Remove the large knurled connecting screw (Figure 5.2.1, Item 1) from the base of the cold tensile accessory (Figure 5.2.1, Item 4). Remove both the tensile bridge (Figure 5.2.1, Item 2) and left tooling jaw from the base of the tensile accessory.
2. Gently slide the threaded boss of tensile accessory base onto the moveable clamp arm (Figure 5.2.2, Item 5) of the strength machine. Replace the knurled screw and hand tighten to attached the cold tensile base to the moveable clamp arm (Figure 5.2.2 and Figure 5.2.3).

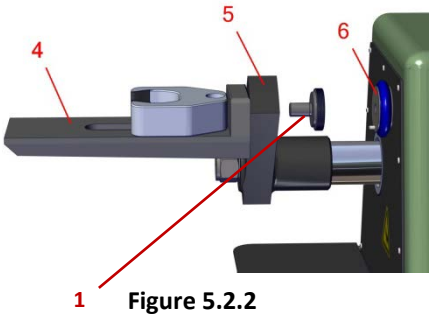


Figure 5.2.2

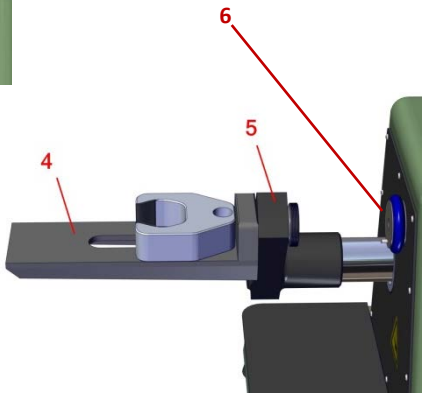


Figure 5.2.3

Item	Description
1	Knurled Screw - Base
2	Bridge
3	Knurled Bridge Nut
4	Base
5	Moveable Clamp Arm
6	Stationary Clamp Holder

3. Place the left tooling jaw and tensile bridge on the top surface of tensile accessory base. Gently slide the bridge pin (Figure 5.2.1) into the hole located in the center of the stationary clamp holder (Figure 5.2.2, Item 6).

Refer to Figures 5.2.4 and 5.2.6, which show detailed photos of the Cold Tensile Strength Accessory, Model 42104C, properly installed on the Electronic Universal Sand Strength Machine, Model 42104.

5.2.3 Operation

1. Turn on air supply and verify correct settings on the air regulator and oil level lubricator. Turn the power switch to the on position (Figure 7.1, Item 1). A "HELLO" message will briefly appear on the digital display. This message will be replaced by numerals.

All LED's and digital displays illuminate momentarily when the power is first turned on.

2. Gently place a prepared sand specimen between the jaws of the tensile tooling.
3. Manually separate (pull apart) the right and left tooling jaws until the rubber coating of the jaws rest on the sides of the sand specimen. The jaws are easily separated by hand.
4. Adjust the knurled bridge nut (Figure 5.2.1, Item 3) until the flat surface of the bridge nut facing the stationary clamp holder (Figure 5.2.2, Item 6) is approximately 1/32" (.078 mm) away from the surface of the stationary clamp holder (see Figure 5.2.5).

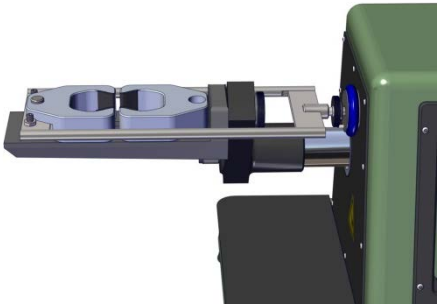


Figure 5.2.4

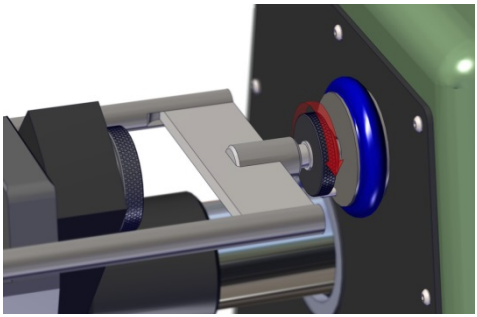
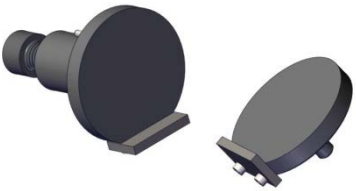


Figure 5.2.5

5. Press the "Test Selection" button (Figure 7.4, Item 13E) until the arrow pointing to "Core Tensile" illuminates.
6. Zero the digital display by pressing the "Zero" button (Figure 7.4, Item 13C). The digital display will read zero.
7. Press the "Start" button (Figure 7.4, Item 13F). The strength machine will begin applying load to the sand specimen. It will continue to apply load until sand specimen failure. The moveable clamp arm will return to home position and the tensile strength value will be displayed in the digital display. The units of measure will be displayed in PSI or N/cm^2 as programmed by the mode of operation switch (AFS or Metric).
8. Remove the broken sand specimen from the tensile accessory and record the tensile strength value from the digital display. Clean any residual sand from the surface of the tensile accessory base and from both tooling jaws.
9. Press the "Clear Display" button (Figure 7.4, Item 13D). The digital display will reset back to zero. The strength machine is ready to run another tensile test.

Figure 5.2.6

5.3 Splitting Strength Accessory



Part No. 0042104D

5.3.1 Description

The Splitting Strength Accessory, Model 42104D, to the Electronic Universal Sand Strength Machine, Model 42104, consists of two specially designed clamps mounted to the strength machine to determine the splitting strength of a clay bonded molding sand in green or dry conditions.

In this test a standard cylindrical sand specimen is squeezed between two specially designed compression clamps. As these clamps squeeze the sand specimen, a split is formed that runs parallel to the axis of the specimen.

The values of splitting strength tests have been found to have very low dispersion. The splitting test is easy to execute and the test utilizes the same type of sand specimen used in the standard green compression test.

It has been found that there is a close correlation between splitting strength and tensile strength in clay bonded molding sand. Since the tensile strength test is difficult and delicate, it is preferable to determine tensile strength as a function of splitting strength.

Tensile and splitting strength reflect the degradation and dilution process of bentonites in molding sand better than the compression test.

5.3.2 Preparing the Molding Sand Specimens for a Splitting Strength Test

The Electronic Universal Sand Strength Machine, Model 42104, requires a standard 2 in. x 2 in. AFS sand specimen (50mm x 50mm metric sand specimen) to test for splitting strength. Manufacture a standard (AFS or metric) sand specimen using a standard sand rammer or pneumatic squeezer (Simpson Technologies Models 42100, 42117 or 42160).

Detailed sand specimen preparation instructions can be found in the operation manual for the sand rammer or sand squeezer being used. Follow the step by step procedure in the operation manual to prepare the proper sand specimen

5.3.3 Installation

1. Install the adjustable clamp holder provided with the Splitting Strength Accessory onto the moveable clamp arm (Figure 5.3.1, Item 5) of the strength machine.
2. Align the pins located on the back side of the splitting strength clamps with the holes located on moveable clamp arm (Figure 5.3.1, Items 5) and stationary clamp holder (Figure 7.3, item 11). Gently slide the clamps onto the moveable clamp arm and stationary clamp holder.

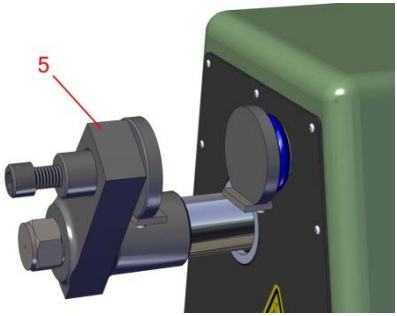


Figure 5.3.1

(See Figure 5.2.3 for Item Description)

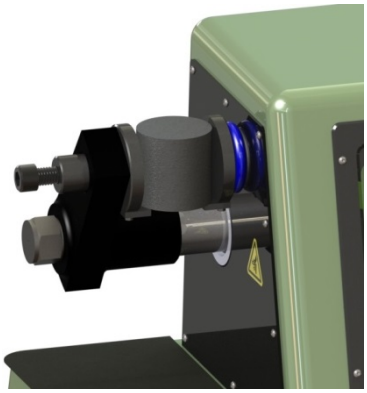


Figure 5.3.2

The splitting strength clamp located on the moveable clamp arm is designed to fit into the adjustable clamp holder. The screw on the adjustable clamp holder can be rotated clockwise and counterclockwise to change the location of the splitting strength clamp mounted onto the moveable clamp arm relative to the splitting strength clamp mounted onto the stationary clamp holder. This adjustment is used when loading sand specimens onto the strength machine and closing the gap between the face of the splitting strength clamps and the sand specimen prior to starting a test

Refer to figure 5.3.2 showing detailed photos of splitting strength clamps properly installed on the strength machine and proper sand specimen installation.

5.3.4 Operation

1. Turn on air supply and verify correct settings on the air regulator and oil level lubricator. Turn the power switch to the on position (Figure 7.1, Item 1). A "HELLO" message will briefly appear on the digital display. This message will be replaced by numerals.

All LED’s and digital displays illuminate momentarily when the power is first turned on.

2. Press the "Test Selection" button (Figure 7.4, Item 13E) until the arrow pointing to "Shear or Split Strength" illuminates.

3. Gently place a prepared 2" x 2" (50mm x 50mm) sand specimen in a vertical position on the flat supporting plates located on the bottom of the splitting strength clamps. The sand specimen shall be positioned so that the specimen will be pressed on the cylindrical surfaces between the splitting strength clamps.

Always transport prepared clay bonded molding sand samples from the shop floor to sand laboratory in a sealed container to help reduce compression strength measurement variation that may occur due to water evaporation from the sand sample. Temperature of the prepared molding sand sample should be tested while transporting the sample container from the shop floor to the laboratory. Sand temperature should be recorded with compression and shear strength data. Prepared clay bonded molding sand of equal compositions with large temperature variations will result in erratic compression strength properties.

4. Using the screw on adjustable clamp holder, carefully turn clockwise or counterclockwise to move the splitting strength clamp located on the moveable clamp arm. Adjust the screw to remove any gap between the surfaces of the sand specimen and the surfaces of both the splitting strength clamps.

NOTICE *Do not over tighten the compression clamps on the sand specimen. Adjust the distance only to close the gap between the surface of the clamps and the sand specimen*

5. Zero the digital display by pressing the "Zero" button (Figure 7.4, Item 13C). The digital display will read zero.

6. Press the "Start" button (Figure 7.4, Item 13F). The strength machine will begin applying load to the sand specimen. It will continue to apply load until sand specimen failure. The moveable clamp arm will return to home position and the splitting strength value will be displayed in the digital display. The units of measure will be displayed in PSI or N/cm^2 as programmed by the mode of operation switch (AFS or Metric).

At the completion of the splitting strength test, the sand specimen is not physically broken. By continuously sensing the strength measurements, the strength machine automatically stops the load application at the exact point of maximum strength. Please refer to Section 3.2 “Description” for more detailed information regarding this advanced feature of the Electronic Universal Sand Strength Machine.

7. Remove the used sand specimen from strength machine and record the strength value from the digital display.

8. The indirect determination of the tensile strength is found applying the formula:

   For N/cm^2 - $R_{ti} = 0.637 \times R_P$

   For PSI - $R_{ti} = 0.9239 \times R_P$

Where:

R_{ti} = Tensile Strength, indirect determination

R_P = Splitting Strength

9. Press the "Clear Display" button (Figure 7.4, Item 13D). The digital display will reset back to zero. The strength machine is ready to run another tensile test.

During a normal test, the sand specimen will typically remain complete only showing two small flat deformations on its cylindrical surfaces positioned against the splitting strength clamps. However, if the load application rate is too fast, the strength machine may not stop automatically at the exact point of maximum strength. If this occurs, the sand specimen will crush/break and the value shown in the digital display may be abnormally large. If encountering a situation where the sand specimen is crushed, then reduces the loading rate or use the following recommended loading rates to adjust the load application speed.

10. Load application speed in molding sands:

	Metric	AFS
	Newtons/cm²/Minute	**PSI/Minute**
Green Splitting	1.4 ± 0.35	2± 0.5

5.4 Green Deformation Accessory

Part No. 0042104E

5.4.1 Description

The Green Deformation Accessory allows an exact and simple measurement of the deformation of green sand samples subject to compression testing.

The green deformation measurement is based on the unique feature of the Electronic Universal Sand Strength Machine, Model 42104, of not destroying the sand specimen upon completion of a green compression strength test. By sensing and automatically stopping the compression load at the point of maximum compression strength the deformation accessory can be used to determine the exact amount deformation that has taken place. Deformation data can be obtained by tracking sand specimen length prior to starting the compression strength test and after reaching maximum strength at the completion of the strength test.

The molding sand deformation is expressed as the ratio between the lengths of the sample before and after the compression test.

5.4.2 Operation

1. Prepare a standard (AFS or metric) sand specimen using a standard sand rammer or pneumatic squeezer. (Simpson Technologies Models 42100, 42117 or 42160).
2. Gently lift the stem of the dial indicator on the Green Deformation Accessory (Figure 5.4.1) and place the sand specimen between the base and foot of the dial indicator (see Figure 5.4.2). Carefully, lower the stem of the dial indicator until its foot reaches the top surface of the sand specimen.

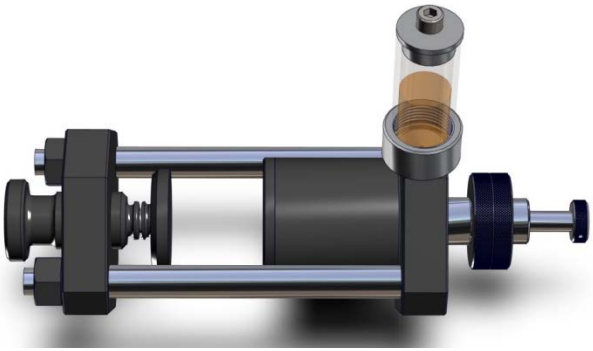
Figure 5.4.1

3. Rotate the bezel of the dial indicator aligning the zero mark of the scale with the needle of the dial indicator (Figure 5.4.2).

Figure 5.4.2

4. Gently lift the stem of the dial indicator and remove the sand specimen from the green deformation accessory after zeroing the dial indicator scale.
5. Carefully, load the measured sand specimen to the Electronic Universal Sand Strength Machine, Model 42104, and run a standard green compression strength following the instructions in Section 5.1 of this manual.
6. When the compression strength test is completed, carefully remove the sand specimen from the strength machine.
7. Gently lift the stem of the dial indicator on the green deformation accessory and place the used sand specimen between the base and foot of the dial indicator. Carefully, lower the stem of the dial indicator until its foot reaches the top surface of the sand specimen
8. Read change in sand specimen length directly on the scale of the dial (see Figure 5.4.2).

5.5 High Compression Strength Accessory



Part No. 0042104H

5.5.1 Description

The High Compression Strength Accessory, Model 42104H, is a force multiplier that when used with the Electronic Universal Sand Strength Machine, Model 42104, can perform a compression strength on a standard 2 in. x 2 in. AFS sand specimen (50mm x 50mm metric sand specimen) with a compressive strength range of 250 - 3100 PSI (170 - 2100 N/cm^2).

The accessory features a frame supporting a hydraulic force multiplier with compression clamps. The unit is designed to be mounted onto an Electronic Universal Sand Strength Machine, Model 42104.

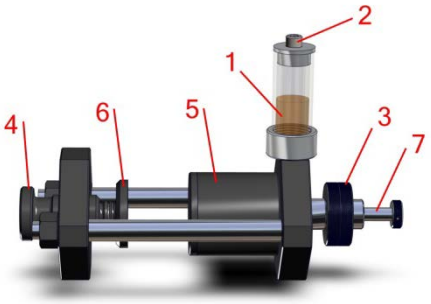


Figure 5.5.1

Item	Description
1	Oil Reservoir
2	Vent Cap
3	Mounting Nut
4	Sample Clamp Adjusting Nut
5	Moving Head
6	Stationary Clamp
7	Slide Rod

5.5.2 Installation

1. Remove the accessory mounting nut (Figure 5.5.1, Item 3) from the supporting frame of the High Compression Strength Accessory.
2. Gently slide the High Compression Strength Accessory onto the moveable clamp arm (Figure 7.3, Item 12) of the strength machine. Replace the mounting nut (Figure 5.5.1, Item 3) and hand tighten to secure the accessory onto the moveable clamp arm of the strength machine (see Figure 5.5.2).
3. Insert one green compression clamp (Figure 5.1.1, Item 3) onto the stationary clamp holder (Figure 7.3, Item 11) of the sand strength machine. Gently slide the clamp onto the stationary clamp holder.

The green compression clamp (Figure 5.1.1, Item 3) must be installed on the stationary clamp holder of the strength machine. The green compression clamp will provide a flat surface for the end of the slide rod (Figure 5.5.1, Item 7) to press against during a compression test.

Before its first use, the High Compression Strength Accessory must be purged of air that may have become entrapped in the hydraulic oil during shipment (see Section 5.5.4, Purging Air from High Compression Strength Accessory).

5.5.3 Operation

1. Turn on the air supply to the strength machine and verify the correct air pressure setting on the air regulator. Turn the power switch to the on position (Figure 7.1, Item 1). A "HELLO" message will briefly appear on the digital display. This message will be replaced by numerals.
2. Press the "Test Selection" button (Figure 7.4, Item 13E) until the arrow pointing to "Compression Strength" illuminates.
3. Pull the slide rod (Figure 5.5.1, Item 7) towards the compression clamp located on the stationary clamp of the strength machine. Pull the slide rod to its fully extended position.

4. Gently hold in place a prepared 2" x 2" (50mm x 50mm) sand specimen between the moving head (Figure 5.5.1, Item 5) and the stationary clamp (Figure 5.5.1, Item 6) of the High Compression Strength Accessory. Using the sample clamp adjusting nut slowly tighten the sand specimen between the moving head and stationary clamp to secure the sand specimen between the two clamps. Tighten the sample clamp adjusting nut just enough to secure the sand specimen in place, do not over tighten the nut.
5. Zero the digital display by pressing the "Zero" button (Figure 7.4, Item 13C). The digital display will read zero.
6. Press the "Start" button (Figure 7.4, Item 13F). The strength machine will begin applying load to the sand specimen. It will continue to apply load until sand specimen failure. The moveable clamp arm will return to home position and a compression strength value will be displayed in the digital display. The units of measure will be displayed in PSI or N/cm2 as programmed by the mode of operation switch (AFS or Metric).
7. Remove the used sand specimen from the strength machine and record the strength value from the digital display
8. When using the High Compression Strength Accessory the results shown in the digital display of the strength machine must be converted to indicate the actual compression strength using the following formula:

$$C_h = C_d \times 10$$

Where:

C_d = Compression Strength Value in Digital Display

C_h = Calculated High Compression Strength

Example:

C_d = 32 PSI

C_h = 32 PSI x 10

C_h = 320 PSI

5.5.4 Purging Air from High Compression Strength Accessory

1. Mount the High Compression Strength Accessory onto the sand strength machine following Steps 1 and 2 in Section 5.5.2 Installation.

2. With the High Compression Strength Accessory mounted on the strength machine in an upright position remove the vent cap (Figure 5.5.1, Item 2).
3. By hand, quickly move the slide rod (Figure 5.5.1, item 7) in and out while observing any air bubbles that may escape through the oil reservoir (Figure 5.5.1, Item 1). Once all of the air bubbles have traveled though the oil within the oil reservoir, repeat this process. Continue this process until no air bubbles are visible rising through the oil within the oil reservoir.
4. Wait 20 minutes.
5. Repeat Steps 3 and 4 until no air bubbles are observed after waiting 20 minutes.
6. Hold a solid object, for example the steel master 2" x 2" (50mm x 50mm) specimen, in the High Compression Strength Accessory between the moving head (Figure 5.5.2, Item 5) and the stationary clamp (Figure 5.5.2, Item 6). While holding the solid object, turn the sample clamp adjusting nut (Figure 5.5.2, Item 4) to push the moving head (Figure 5.5.2, Item 5) towards the strength machine moving the slide rod (Figure 5.5.2, Item 7) out towards the strength machine's stationary clamp. Manually, move the slide rod in and out several times until there is resistance to any further movement.
7. Reinstall the vent cap (Figure 5.5.2, Item 2) onto the oil reservoir (Figure 5.5.2, Item 1)
8. The High Compression Strength Accessory is now ready for use.

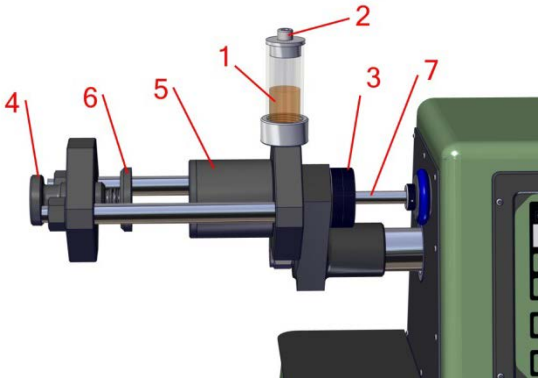
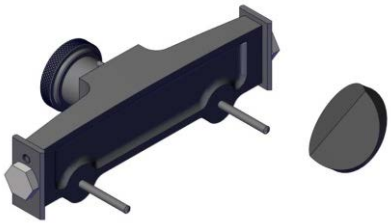


Figure 5.5.2

(See Figure 5.5.1 for Item Description)

5.6 Core Transverse Accessory



Part No. 0042104K / 0042104K-M

5.6.1 Description

The Core Transverse Accessory, Model 42104K, is used for transverse strength testing of chemically bonded foundry sand samples. The clamps of this accessory are mounted onto the Electronic Universal Sand Strength Machine, Model 42104. The accessory holds the standard 1 in. x 1 in x 8 in. AFS (22.4 mm x 22.4 mm x 205 mm metric) rectangular transverse sand specimens.

5.6.2 Installation

1. Remove the large knurled connecting screw from the transverse accessory.
2. Gently slide the threaded boss of transverse accessory onto the moveable clamp arm (Figure 7.3, Item 12) of the strength machine. Replace the knurled screw and hand tighten to attached the transverse accessory to the moveable clamp arm.
3. Gently slide the pin located on the back side transverse fixed point clamp into the hole located in the center of the stationary clamp holder (Figure 7.3, Item 11).

Refer to Figure 5.6.1 which shows a detailed photo of the Core Transverse Accessory, Model 42104K, properly installed on the Electronic Universal Sand Strength Machine, Model 42104.

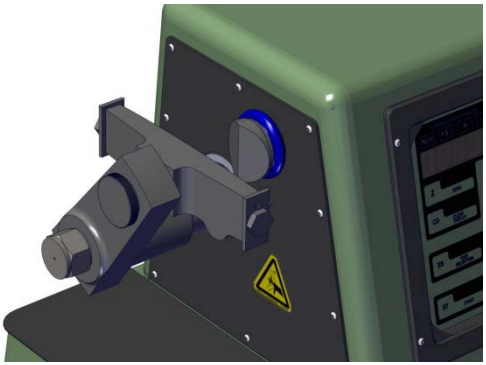


Figure 5.6.1

5.6.3 Operation

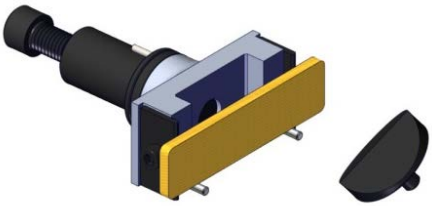
1. Turn on air supply and verify correct settings on the air regulator and oil level lubricator. Turn the power switch to the on position (Figure 7.1, Item 1). A "HELLO" message will briefly appear on the digital display. This message will be replaced by numerals.

All LED's and digital displays illuminate momentarily when the power is first turned on.

2. Gently place a prepared transverse sand specimen onto the two support pins located on the bottom of the transverse accessory located on the moveable clamp arm. Position the sand specimen so that it makes contact with the edge of both outer blades of the transverse accessory. The transverse sand specimen will be located between the transverse accessory and the transverse fixed point clamp.
3. Press the "Test Selection" button (Figure 7.4, Item 13E) until the arrow pointing to "Core Transverse Strength" (Figure 7.5, Item 13G-5) illuminates.
4. Zero the digital display by pressing the "Zero" button (Figure 7.4, Item 13C). The digital display will read zero.

5. Press the "Start" button (Figure 7.4, Item 13F). The strength machine will begin applying load to the sand specimen. It will continue to apply load until sand specimen failure. The moveable clamp arm will return to home position and the tensile strength value will be displayed in the digital display. The units of measure will be displayed in PSI or N/cm2 as programmed by the mode of operation switch (AFS or Metric).
6. Remove the broken sand specimen from the transverse accessory and record the transverse strength value from the digital display. Clean any residual sand from the transverse accessory.
7. Press the "Clear Display" button (Figure 7.4, Item 13D). The digital display will reset back to zero. The strength machine is ready to run another transverse strength test.

5.7 Shell Transverse Strength Accessory



Part No. 0042104L / 0042104L-M

5.7.1 Description

The Shell Transverse Strength Accessory, Model 42104L, is attached to the Electronic Universal Sand Strength Machine, Model 42104, and is used to break shell (Croning) transverse specimens. The accessory holds the standard AFS .25 in. thick shell transverse sand specimens (6mm thick metric specimens).

5.7.2 Installation

Turn the power switch (Figure 1, Item 1) to the off position when fastening the shell transverse accessory onto the sand strength machine. Be aware of a potential pinch hazard when inserting the shell transverse accessory onto the strength machine and when loading a sand specimen onto the transverse accessory.

1. Install the adjustable clamp holder onto the movable clamp arm (Figure 7.3, Item 12) of the strength machine.
2. Align the pins located on the back of the shell transverse support clamp and shell transverse fixed point clamp with the holes on the moveable clamp arm (Figure 7.3, Item 12) and the stationary clamp holder (Figure 7.3, Item 11). Gently slide the clamps onto the moveable clamp arm and the stationary clamp holder of the strength machine.

Refer to Figure 5.7.1 which shows a detailed photo of the Shell Transverse Accessory, Model 42104L, properly installed on the Electronic Universal Sand Strength Machine, Model 42104.

5.7.3 Operation

1. Turn on air supply and verify correct settings on the air regulator and oil level lubricator. Turn the power switch to the on position (Figure 7.1, Item 1). A "HELLO" message will briefly appear on the digital display. This message will be replaced by numerals.

All LED’s and digital displays illuminate momentarily when the power is first turned on.

2. Gently place a prepared shell transverse sand specimen onto the two support pins located on the bottom of the shell transverse accessory located on the movable clamp arm. Position the sand specimen so that it makes contact with the edge of both outer blades of the shell transverse accessory. The shell transverse sand specimen will be located between the shell transverse accessory and the transverse fixed-point clamp.
3. Press the "Test Selection" button (Figure 7.4, Item 13E) until the arrow pointing to "Force" illuminates (Figure 7.5, Item 13G-6).

4. Zero the digital display by pressing the "Zero" button (Figure 7.4, Item 13C). The digital display will read zero.
5. Press the "Start" button (Figure 7.4, Item 13F). The strength machine will begin applying load to the sand specimen. It will continue to apply load until sand specimen failure. The movable clamp arm will return to home position and the tensile strength value will be displayed in the digital display. The units of measure will be displayed in lbs. or N as programmed by the mode of operation switch (AFS or Metric).
6. Remove the broken sand specimen from the shell transverse accessory and record the transverse strength value from the digital display. Clean any residual sand from the shell transverse accessory.
7. Press the "Clear Display" button (Figure 7.4, Item 13D). The digital display will reset back to zero. The strength machine is ready to run another shell transverse strength test.

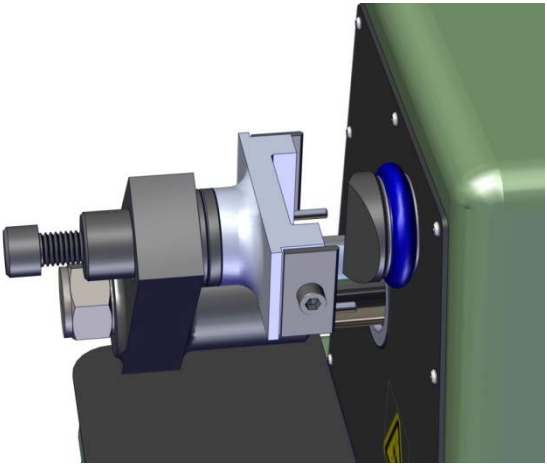


Figure 5.7.1

5.8 Cold Shell Tensile Strength Accessory

Part No. 0042104N / 0042104N-M

5.8.1 Description

The Cold Shell Tensile Accessory, Model 42104N, is used to determine tensile strength of shell coated (Croning) mold and core sands when mounted on the Electronic Universal Sand Strength Machine, Model 42104. Tensile strength data is generated using standard .25 in^2 AFS dog bone shell tensile specimens and metric dog bone shell tensile specimens.

The accessory is supplied with one set of specimen tooling jaws, tensile accessory base and tensile bridge.

5.8.2 Installation

1. Remove the large knurled connecting screw from the tensile accessory base. Remove both the tensile bridge and left tooling jaw from the base of the tensile accessory.

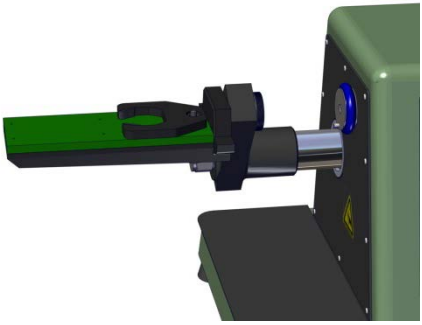


Figure 5.8.1

2. Gently slide the threaded boss of tensile accessory base onto the moveable clamp arm (Figure 7.3, Item 12) of the strength machine. Replace the knurled screw and hand tighten to attach the tensile accessory base to the moveable clamp arm (see Figure 5.8.1).
3. Place the left tooling jaw and tensile bridge on the top surface of tensile accessory base (Figure 5.8.2). Gently slide the bridge pin into the hole located in the center of the stationary clamp holder (Figure 7.3, Item 11).

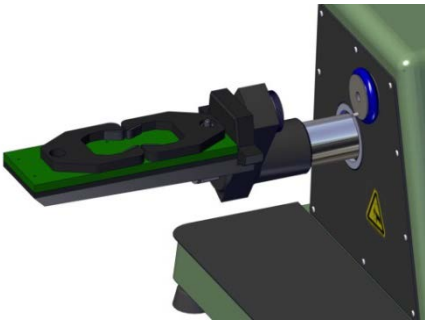


Figure 5.8.2

Refer to Figure 5.8.3 which shows a detailed photo of the Cold Shell Tensile Strength Accessory, Model 42104N properly installed on the Electronic Universal Sand Strength Machine, Model 42104.

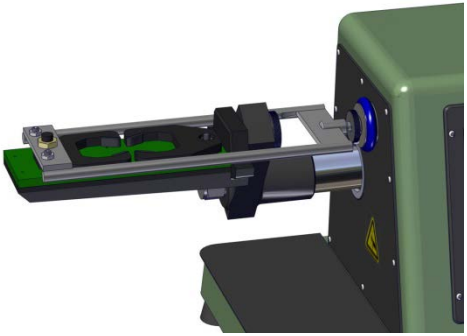


Figure 5.8.3

5.8.3 Operation

1. Turn on air supply and verify correct settings on the air regulator and oil level lubricator. Turn the power switch to the on position (Figure 7.1, Item 1). A "HELLO" message will briefly appear on the digital display. This message will be replaced by numerals.

All LED's and digital displays illuminate momentarily when the power is first turned on.

2. Gently place a prepared sand specimen between the jaws of the tensile tooling.
3. Manually separate (pull apart) the right and left tooling jaws until the rubber coating of the jaws rests on the sides of the sand specimen. The jaws are easily separated by hand.
4. Adjust the knurled bridge nut (Figure 5.8.4) until the flat surface of the bridge nut facing the stationary clamp holder (Figure 7.3, Item 11) is approximately 1/32" (.078 mm) away from the surface of the stationary clamp holder.

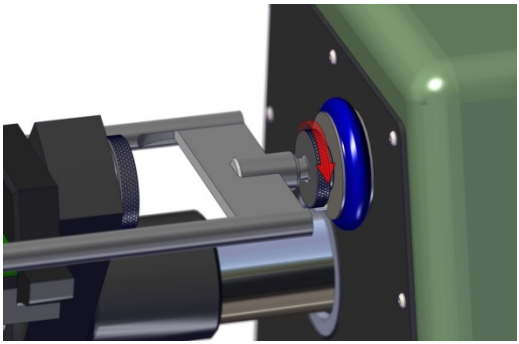
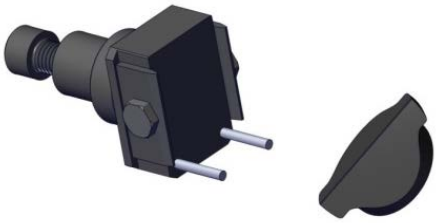


Figure 5.8.4

5. Press the "Test Selection" button (Figure 7.4, Item 13E) until the arrow pointing to "Shell/Hot Box Tensile Str" illuminates.
6. Zero the digital display by pressing the "Zero" button (Figure 7.4, Item 13C). The digital display will read zero.

7. Press the "Start" button (Figure 7.4, Item 13F). The strength machine will begin applying load to the sand specimen. It will continue to apply load until sand specimen failure. The moveable clamp arm will return to home position and the tensile strength value will be displayed in the digital display. The units of measure will be displayed in PSI or N/cm2 as programmed by the mode of operation switch (AFS or Metric).
8. Remove the broken sand specimen from the tensile accessory and record the tensile strength value from the digital display. Clean any residual sand from the surface of the tensile accessory base and from both tooling jaws.
9. Press the "Clear Display" button (Figure 7.4, Item 13D). The digital display will reset back to zero. The strength machine is ready to run another tensile test.

5.9 Disk Transverse Attachment



Part No. 0042104P

5.9.1 Description

The Disk Transverse Accessory, Model 42104P, is mounted on the Electronic Universal Sand Strength Machine, Model 42104, to determine the disk transverse strength of chemically bonded core and molding sands.

5.9.2 Installation

Turn the power switch (Figure 7.1, Item 1) to the off position when fastening the disk transverse accessory onto the sand strength machine. Be aware of a potential pinch hazard when inserting the disk transverse accessory onto the strength machine and when loading a sand specimen onto the disk transverse accessory.

1. Install the adjustable clamp holder onto the moveable clamp arm (Figure 7.3, Item 12) of the strength machine.

2. Align the pins located on the back of the disk transverse support clamp and disk transverse fixed point clamp with the holes on the moveable clamp arm (Figure 7.3, Item 12) and the stationary clamp holder (Figure 7.3, Item 11). Gently slide the clamps onto the moveable clamp arm and the stationary clamp holder of the strength machine.

Refer to Figure 5.9.1 which shows a detailed photo of the Disk Transverse Accessory, Model 42104P, properly installed on the Electronic Universal Sand Strength Machine, Model 42104.

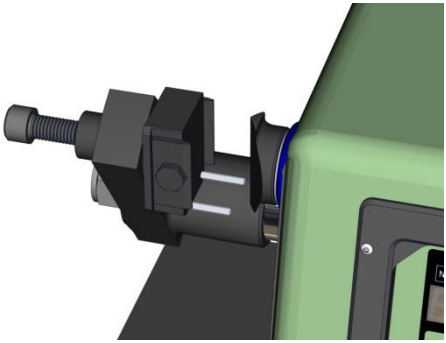


Figure 5.9.1

5.9.3 Operation

1. Turn on air supply and verify correct settings on the air regulator and oil level lubricator. Turn the power switch to the on position (Figure 7.1, Item 1). A "HELLO" message will briefly appear on the digital display. This message will be replaced by numerals.

All LED's and digital displays illuminate momentarily when the power is first turned on.

2. Gently place a prepared disk transverse sand specimen onto the two support pins located on the bottom of the shell transverse accessory located on the moveable clamp arm. Position the sand specimen so that it makes contact with the edge of both outer blades of the disk transverse accessory. The disk transverse sand specimen will be located between the disk transverse accessory and the disk transverse fixed point clamp.
3. Press the "Test Selection" button (Figure 7.4, Item 13E) until the arrow pointing to "Force" illuminates.
4. Zero the digital display by pressing the "Zero" button (Figure 7.4, Item 13C). The digital display will read zero.
5. Press the "Start" button (Figure 7.4, Item 13F). The strength machine will begin applying load to the sand specimen. It will continue to apply load until sand specimen failure. The moveable clamp arm will return to home position and the tensile strength value will be displayed in the digital display. The units of measure will be displayed in lbs or N as programmed by the mode of operation switch (AFS or Metric).
6. Remove the broken sand specimen from the disk transverse accessory and record the disk transverse strength value from the digital display. Clean any residual sand from the disk transverse accessory.
7. Press the "Clear Display" button (Figure 7.4, Item 13D). The digital display will reset back to zero. The strength machine is ready to run another disk transverse strength test.

5.10 MOR Bar Test Fixture Accessory

5.10.1 Description

The MOR Bar Test Fixture Accessory (Part No. 211219) is attached to the Electronic Universal Sand Strength Machine, Model 42104, and is used to break investment casting MOR Bars.

5.10.2 Installation

1. Place the MOR Bar Test Fixture adapter ring onto the adjustable clamp holder supplied with accessory. The adapter ring is designed for and must be used with standard MOR specimens in order to properly space the specimen from the fixed portion of the test fixture mounted to the stationary clamp holder (Figure 7.3, Item 11).
2. Assemble the MOR Bar test accessory on the Electronic Universal Sand Strength Machine, Model 42104, by carefully aligning the guide pins into the respective holes on the movable and stationary clamp holders of the strength machine.

5.10.3 Operation

1. Turn on air supply and verify correct settings on the air regulator and oil level lubricator. Turn the power switch to the on position (Figure 7.1, Item 1). A "HELLO" message will briefly appear on the digital display. This message will be replaced by numerals.

All LED's and digital displays illuminate momentarily when the power is first turned on.

2. Place a MOR specimen over the support pins of the clamps.
3. Press the "Test Selection" button (Figure 7.4, Item13E) until the arrow pointing to "Force" illuminates
4. Zero the digital display by pressing the "Zero" button (Figure 7.4, Item 13C). The digital display will read zero.
5. Touch the "Start" button. The Electronic Universal Sand Strength Machine will start loading and break the specimen. After breaking the specimen, the moveable clamp arm will return to its home position. The digital display will show the ultimate breaking strength of the MOR Bar. The units of measure will be displayed in Lbs or N as programmed by the mode of operation switch (AFS or Metric).
6. Press the "Clear Display" button (Figure 7.4, Item 13D). The digital display will reset back to zero. The strength machine is ready to run another tensile test.

5.11 Error Messages

This information can be used to identify and troubleshoot any error messages that may appear in the digital display (Figure 7.4, Item 13B) of the Electronic Universal Sand Strength Machine, Model 42104.

Any time during operation, if the machine senses a system functioning out of control, an error message will be shown on the digital display. Following are the error codes and their corresponding translations:

E---1 Overloads

E---2 Negative values

E---3 Zero out of range

E---4 Not ready to start

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.

Despite its robust construction, the Electronic Universal Sand Strength Machine, Model 42104, is a precise mechanical/electronic measurement device and needs appropriate care.

Before performing any maintenance, turn-off the Lock-Out air supply valve and remove the electrical power cord from the wall receptacle. The Electronic Universal Sand Strength Machine must be put into Zero Mechanical State (ZMS). Follow Lockout and Tagout procedures before servicing

Replace all panels before operating the machine. A hazardous voltage is present, can cause electric shock or burn, and will result in serious injury.

6.1 Maintenance

6.1.1 Daily Maintenance

- Remove and clean any loose sand/dirt from the outside of the strength machine.
- Keep the strength machine accessories clean.

6.1.2 Weekly Maintenance

Compressed Air

- Drain any condensation from the air filter located under the regulator in the air regulator/filter/lubricator.
- Check air pressure at the regulator/filter/lubricator and adjust if required.
- Check the oil level in the air lubricator. Verify that the oil addition rate is correct and adjust if required.

6.1.3 Monthly Maintenance

- Lightly oil external part of the main stem with an SAE oil.

6.1.4 Biennial Maintenance (every two years)

- Change the hydraulic oil with a Shell Tellus 27 or equivalent. Proceed in the following way:

1. To drain oil, remove any accessories from both the moveable clamp arm (Figure 7.3, Item 12) and stationary clamp holder (Figure 7.3, Item 11). Place the machine in a vertical position with the moveable clamp arm upright over a flat container. Be extremely careful to keep the strength machine level while it is in the vertical position by using wooden blocks positioned on the opposite side of the moveable clamp arm. Make certain that the wooden blocks are tall enough to avoid resting the weight of the strength machine on the motor and brake adjustment knobs.
2. Position an empty cup with a capacity of approximately 200/300 ml below the strength machine vent port (Figure 7.1, Item 6). The cup will capture the expelled used oil from the strength machine.
3. Turn on the air supply and verify the correct pressure setting on the air regulator. Turn the power switch to the on position (Figure 1, Item 1).
4. Press the “Start" button (Figures 7.3 & 7.4, Item 13F) and allow the moveable clamp arm (Figure 7.3, Item 12) to run down to its end position. After the moveable clamp arm arrives at the end position press and quickly release the stationary clamp holder (Figure 7.3, Item 11) which will cause the moveable clamp arm to return to home position.
5. During this cycle the strength machine will pump out used oil from the vent port (Figure 7.1, Item 6) into the catch container. Repeat Step 4 and allow time between cycles for the oil to drain out of the strength machine. Continue repeating Step 4 until the used oil is completely drained from the strength machine.
6. After draining, place the strength machine in its normal upright position. Connect a small hose into the unplugged vent port (Figure 7.1, Item 6).
7. Fill a clean container with 200 ml of hydraulic oil (Shell Tellus 27) and place the free end of the small hose into the oil.

Make certain that the end of the hose located in the oil container is kept below the oil level to allow oil to be suctioned into the strength machine.

8. Start the machine and continue to cycle the machine until the oil level in the container does not descend.

After the hose has been removed from the container and strength machine some oil may leak from the vent port due to residual oil in the hoses within the strength machine

6.2 Calibration

Prior to shipment each Electronic Universal Sand Strength Machine, Model 42104, is individually factory calibrated with dead weights. Since this method is extremely cumbersome, the preferable method of field calibration is to use a mechanical strain gauge that has been calibrated by Simpson Technologies in three positions by dead weights. The strength machine features digital calibration which means that the measuring parameters are set using the keyboard. There is no need to adjust internal potentiometers as is the usual in many electronic devices.

Make certain that the instrument is in the test selection "*Force*" to proceed to calibrate.

6.2.1 Calibration Accessories

Mechanical Load Cell

The Mechanical Load Cell, Model 42125, is used to calibrate force on the Electronic Universal Sand Strength Machine, Model 42104. Each mechanical load cell is supplied with certification documentation.

Part No. 0042125

Specifications	Mechanical Load Cell (Approximate)
Length	ca. 191 mm (7.5")
Width	ca. 102mm (4")
Height	ca. 25 mm (1")
Weight	ca. 1 kg (2.2 lbs.)

6.2.2 Calibrating the Strength Machine

The electronic load cell on the Model 42104 should be calibrated once every six months and the mechanical load cell should be calibrated every two years, provided it is not subjected to abuse.

1. Turn the power switch to the on position (Figure 7.1, Item 1).
2. All digits in the digital display and test indicator lights will illuminate on and off one time.
3. After approximately five seconds, a "HELLO" message appears in the digital display (Figures 7.3 & 7.4, Item 13B). If any button is pressed four times while the "HELLO" message is displayed, the strength machine will be set in calibration mode.
4. When the "HELLO" message is finished and if the calibration mode was chosen, three messages will appear successively on the digital display: "SET-UP", "CALIb" and "rESET." The desired mode is selected by pressing the "Start" button (Figures 7.3 & 7.4, Item13F) at the moment the message appears on the display.

Simpson Technologies does not recommend using the “SET-UP” and "RESET" modes when calibrating this machine. These functions are intended for Simpson Technologies technical service personnel use only.

5. Select the calibration mode by following the directions outlined in steps 2 thru 5 and pressing the "Start" button (Figures 7.3 & 7.4, Item 13F) when the "CALIb" message appears on the digital display (Figures 7.3 & 7.4, Item13B).

The "CALIb" function allows for the calibration of the accuracy and linearity of the electronic load cell using the Mechanical Load Cell, Model 42125.

6. The "HELLO" message will appear again on the digital display and the Strengths & Forces "N/cm2" indicating light (Figures 7.3 & 7.4, Item 13A) will start blinking. At this time press the "Start" button. The "HELLO" message will display again followed by the number "0" indicating that the machine is zeroed. The "N" (newtons) indicating light (Figures 7.3 & 7.4, Item13A) will begin to blink.
7. Remove any attachments from the movable clamp arm and stationary clamp holder.

8. Replace the attachments with the adjustable support ball and fixed support ball that are included with the Mechanical Load Cell, Model 42125. The adjustable support is inserted onto the movable clamp arm (Figure 7.3, Item 12) by gently sliding into the mating hole (see Figure 6.2.1). It is extremely important that the calibration and conic supports are clean and free of loose sand. Insert the fixed support ball into the hole located in the center of the stationary clamp holder (Figure 7.3, Item 11). (See Figure 6.2.2 and 6.2.3).

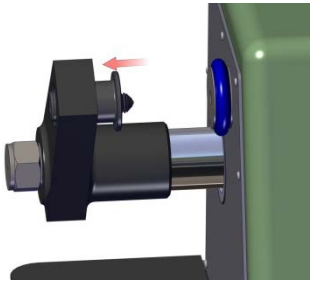


Figure 6.2.1

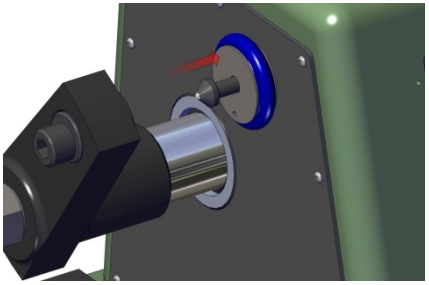


Figure 6.2.2

9. Unscrew the Allen screw on the adjustable support ball to protrude no more than 2 mm (1/16") from the face of the support.

10. Prior to mounting the mechanical load cell into the strength machine, clean and lightly oil the two seating sockets located on the right and left of the mechanical load cell.

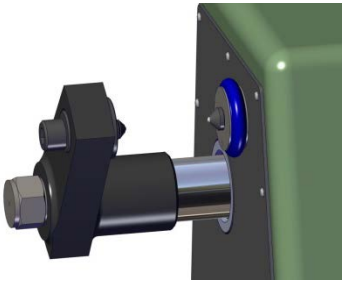


Figure 6.2.3

11. Mount the load cell between the stationary clamp holder (Figure 7.3, Item 11) and the movable clamp arm (Figure 7.3, Item 12).(See Figure 6.2.4)

Figure 6.2.4

12. Locate the maximum deflection and load (Point 3) as shown on the calibration certificate that was supplied with the mechanical load cell.

Example of Control Standardization Table

Check Points				Calibration Set Point	
Point 1		Point 2		**Point 3**	
Deflection	Force	Deflection	Force	Deflection	Force
.01 mm	Newtons	0.1 mm	Newtons	0.1 mm	Newtons
44.5	637	135.0	1909	**227.0**	**3198**

NOTE: The values for each mechanical load cell will be different than in the table above.

Each gauge is certified with dead weights at three points by the manufacturer. A certified certificate is supplied with every Mechanical Load Cell that states these three points in both deflection in .01 millimeters and corresponding force in newtons.

The correct .01 mm of deflection and the correlating load in newtons can be found under Calibration Set Point in the Control Standardization Table on the calibration certificate.

13. Using the Allen wrench provided, slowly tighten the Allen screw on the adjustable support ball until the dial indicator on the mechanical load cell reaches the maximum deflection point (Point 3) as recorded on the mechanical load cell calibration sheet.
14. After reaching the correct .01 mm deflection on the mechanical load cell, then visually verify that the digital display (Figures 7.3 & 7.4, Item 13B) is showing the correct load in newtons. If the value is not correct, the display can be adjusted per step 15; otherwise, proceed to step 16.
15. Corrections to value displayed can be made by pressing the following buttons:
    - » Rapid increase - Press the "Zero" button (Figures 7.3 & 7.4, Item 13C)
    - » Rapid decrease - Press the "Test Selection" button (Figures 7.3 & 7.4, Item 13E)
    - » Slow increase - Press the "Clear Display" button (Figures 7.3 & 7.4, Item 13D)
16. Once the correct value is obtained in the digital display, press the "Start" button to confirm the new calibration values.

6.2.3 Regulating the Load Application Rate

The Electronic Universal Sand Strength Machine is capable of an infinitely variable load application rate. By adjusting the speed of the hydraulically regulated pneumatic cylinder the user can choose and set a load rate. The Electronic Universal Strength Machine load rate has been preset by the manufacturer to 120 ±10 PSI (8.275 ±.6895 bar) per minute when the regulator/filter/lubricator is set to 75 PSI (5.2 bar).

After setting the incoming air pressure on the pneumatic regulator/filter/lubricator, there are two adjustments that can be made to adjust the load application rate of the strength machine. The coarse regulation of the load application rate can be made by adjustments to the pneumatic motor valve (Figure 7.2, Item 10). Fine load rate regulation is made by adjustments to the hydraulic brake (Figure 7.2, Item 9).

To make a coarse adjustment to the applied load rate turn the pneumatic motor adjusting screw (Figure 7.2, Item 10) clockwise or counter-clockwise. The load application rate is decreased by turning the speed adjusting screw clockwise. The load application rate is increased by turning the speed adjusting screw counterclockwise.

The regulation can be then be finely tuned to a load rate for the testing requirement by adjusting the hydraulic brake valve (Figure 7.2, Item 9). Turning the screw clockwise decreases the load application rate. Turning the screw counterclockwise increases the load application rate.

To set the load regulation rate, first set the incoming air pressure at the pneumatic regulator/filter/lubricator. After setting the incoming air pressure, adjust both the pneumatic motor and hydraulic brake until reaching the load rate desired. For most standard applications use a load rate of 95-125 PSI (6.55-8.618 bar) per minute.

It is important that the load rates are not changed between tests. A significant change in load application rate can result in different test results. This occurrence is especially pronounced in clay bonded molding sands.

Load application rates are determined by dividing the maximum load value shown in the digital display by the span of time between the beginning and the end of the figures movement in the digital display.

6.3 Set-up and Reset Functions

Simpson Technologies does not recommend using the “SET-UP” and “RESET" modes when calibrating this machine. These functions and procedures are provided for Simpson Technologies technical servicemen.

1. Turn the power switch to the on position (Figure 7.1, Item1).
2. All digits in the digital display (Figures 7.3 & 7.4, Item 13B) and test indicator lights will illuminate on and off one time.
3. After approximately five seconds, a "HELLO" message appears in the digital display (Figures 7.3 & 7.4, Item 13B). If any button is pressed four times while the "HELLO" message is displayed, the strength machine will be set in calibration mode.
4. When the "HELLO" message is finished and if the calibration mode was chosen, three messages will appear successively on the digital display: "SET-UP," "CALIb" and "rESET." The desired mode is selected by pressing the "Start" button (Figures 7.3 & 7.4, Item13F) at the moment the message appears on the display.

SET-UP:

5. The "SET-UP" function sets the content of the strength machine's registers. To select "SET-UP" press the "Start" button (Figures 7.3 & 7.4, Item 13F) while the "SET-UP" message appears on the digital display. After pressing, the display will show the "HELLO" message followed successively by pairs of numbers: the first digit from the left in the digital display represents the register number and the last digit of the display tells the content of the respective register. The content values should match the following table:

Register	Content
1	0
2	0
3	6
4	2
5	2
6	2
7	2
8	2
9	0

6. To change from one register to the next, press the press the "Start" button (Figure 7.4, Item 13F) and the digital display will advance to the following register and respective content.

7. If the content of a register is wrong it must be corrected. To correct a register's content, press the "Clear Display" button (Figure 7.4, Item 13D) to raise content value or the "Test Selection" button (Figure 7.4, Item 13E) to reduce the value. After passing register 9, the number 255 will appear in display. Press the "Start" button to return to the "HELLO" message.

RESET:

8. The "rESET" function sets the machine within the fabrication parameters. To reset the fabrication parameters, press the "Start" button (Figure 7.4, Item 13F) when the "rESET" message appears on the digital display. After pressing the "Start" button while the digital display shows "rESET," all digits in the display will illuminate signifying the operation is fulfilled. Shortly after a "HELLO" message will be displayed again. If any key is pressed four times while this message is displayed, the three calibration modes will reappear successively. At this point all parameters are reset to their original manufacturer's values.
9. If the strength machine has been reset to fabrication parameters, the machine's registers must be reset at the correct content.

7 Apparatus Layout

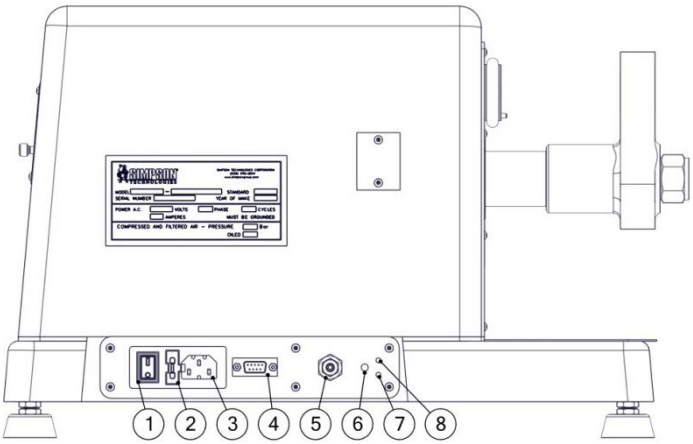


Figure 7.1: Back View

Item	Description
1	Power Switch
2	Fuse Holder
3	Power Cord Receptacle
4	RS232 Port
5	Pneumatic Input
6	Vent Port
7	Vent Port
8	Vent Port

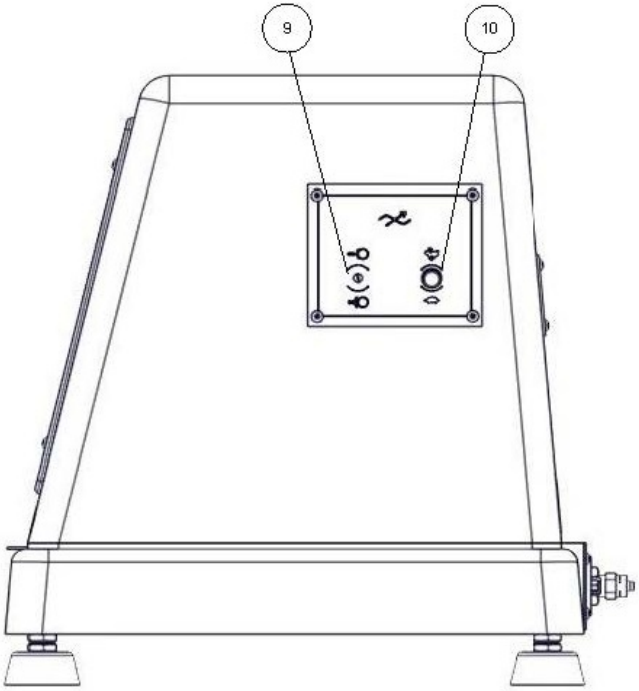


Figure 7.2: Right Side View

Item	Description
9	Hydraulic Brake Adjustment
10	Motor Adjustment

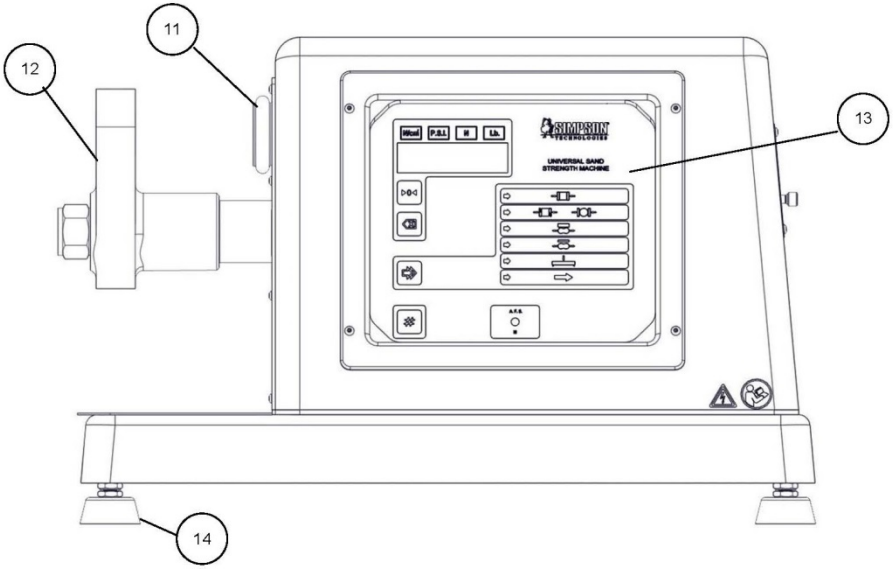


Figure 7.3: Front View

Item	Description
11	Stationary Clamp Holder
12	Moveable Clamp Arm
13	Electric Panel
14	Leveling Foot (4)

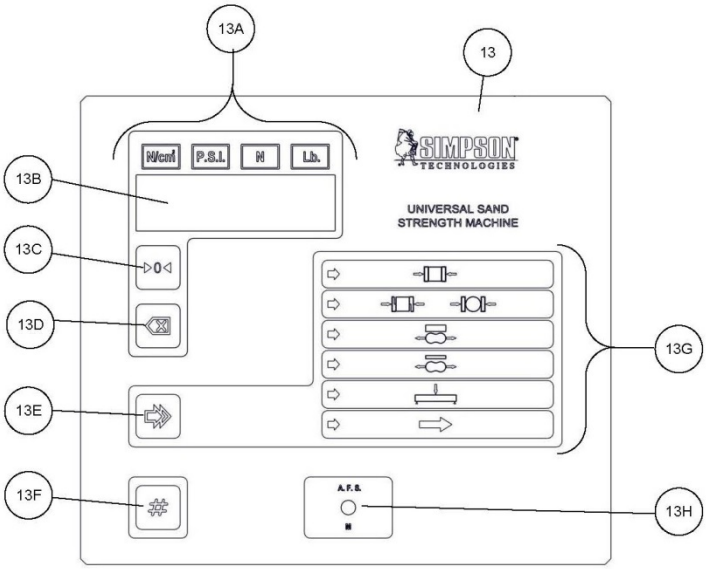


Figure 7.4: Electronic Panel

Item	Symbol	Description
13	-	Electronic Panel
13A	-	Units of Measure Display
13B	-	Digital Display
13C	▶0◀	Zero Button
13D	⌫	Clear Display Button
13E	⇨	Test Selection Button
13F	#	Start Button
13G	-	Test Selection Indicator
13H	A. F. S. M	Standard Selector Switch

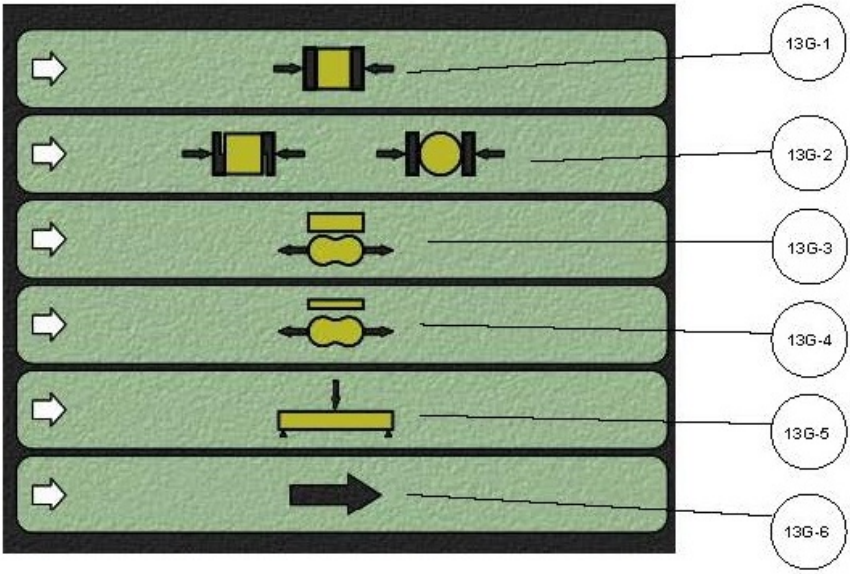


Figure 7.5: 13G Test Selection Detail

Item	Description
13G-1	Compression Strength Symbol
13G-2	Shear or Split Strength Symbol
13G-3	Core Tensile Strength Symbol
13G-4	Shell-Hot Box Tensile Strength Symbol
13G-5	Core Transverse Strength Symbol
13G-6	Force Symbol

8 Parts List / Ordering Parts / Returns

8.1 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
211258	Electronic Package (CE) - Symbols
0046185	Cylinder Repair Kit (O-ring Set)
0042104J	Green Compression & Sheer Accessories (AFS)
0042104J-M	Green Compression & Sheer Accessories (Metric)
211207	Memory Chip Kit
211201	Alignment Rod

8.2 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 www.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.

8.3 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:

- **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, fax, 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.

9 Decommissioning

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

Failure to follow safety procedures could result in serious injury.

Use qualified personal and follow safety procedures, applicable local policies and regulations in decommissioning the Electronic Universal Sand Strength Machine and peripheral equipment.

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

Air Supply: Shut-off all plant airlines supplying air to the pneumatic components and bleed the down stream air lines before dismantling.

WASTE DISPOSAL

The machinery and controls consists of:

- Iron
- Aluminum
- Copper
- Plastic
- Electronic Components and circuit boards

Dispose of the parts in accordance with the applicable regulations.

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In North America

Simpson Technologies
2135 CityGate Lane Suite S00
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

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