

SIMPSON

A Norican Technology

Operating Instructions

Shatter Index Tester

Model 42159



Type:

Shatter Index Tester

Model No.:

42159

Part No.:

0042159-ASM

Serial No.

Name and address of manufacturer:

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

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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 Shatter Index Tester 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 Shatter Index Tester, Model 42159, is designed to measure resistance to degeneration and plasticity of clay bonded sand upon impacting a target at a fixed velocity. This “shatter index” has been shown to correspond to the ability to draw deep pockets during the molding process. 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 Introduction

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 Operation Maintenance 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 symbology and hazard severity panels and thus, can be used for both the U.S. and international markets.

2 Safety

2.1.1 Safety Alert Symbols



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



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



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



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



HAND PINCH / MOVING PARTS (STC #214013)

This label is located on the Shatter Index Tester power head immediately above the stripping post base.

Use caution while loading the sand specimen tube into the stripping post as your hands are in close proximity to the stripping post base that, if actuated, can pinch or crush fingers resulting in serious injury. Follow **Lockout and Tagout** procedures before servicing.



COMPRESSED AIR / RELEASE OF PRESSURE (STC #204578)

This label is located on the Shatter Index Tester base behind the column supporting the power head, next to the air inlet connection.

The air line supplies compressed air to the Shatter Index Tester power head and contains high-pressure air that can cause injuries. Follow **Lockout and Tagout** procedures before servicing.



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

This label is located toward the top of the Shatter Index Tester power head.

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 Safety

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 professionally 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 Shatter Index Tester, Model 42159, is designed to measure resistance to degeneration and plasticity of clay bonded sand upon impacting a target at a fixed velocity. This “shatter index” has been shown to correspond to the ability to draw deep pockets during the molding process.

3.2 Description

The specimen tube containing the prepared sand sample (AFS 2” x 2” or metric 50 mm x 50 mm) is prepared and placed in the sand sample tube holder on the apparatus. The device is then activated via an automatic control knob that pneumatically retracts the specimen tube while restraining the sand specimen. The retraction of the specimen tube allows the sand sample to be dropped from a set distance with an initial velocity of zero. By utilizing this automated design, the operator influence that normally dictates the starting velocity in older designs is eliminated and the sand sample has a controlled and constant descent until contacting the anvil. Once the sand sample impacts the anvil, the degenerated sand falls through the screen and is collected in the custom molded catch pan for analysis.

The Shatter Index Tester includes a centering plumb bob for leveling, pneumatic regulator/filter, sample tray, pneumatic tubing and connectors to connect the supplied regulator/filter to a compressed air source.

3 Short Description & Specifications

3.3 Specifications, Dimensions and Weights (Approximate)

Specifications	Shatter Index Tester
Length	508 mm (20 in.)
Width	381 mm (15 in.)
Height	2426 mm (96 in.)
Weight	44.8 kg (155 lbs.)
Compressed Air	3.5 bar (50-55 psi)

4 Unpacking and Installation

4.1 Unpacking

NOTICE

Your new Laboratory Equipment has been thoroughly inspected before being shipped to your plant. However, damage can occur en 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 Shatter Index Tester, Model 42159, is shipped in two sections. The instrument will require some basic assembly before use. The approximate instrument shipping dimensions are 55 in. x 24 in. x 20 in (1397 mm x 610 mm x 508 mm). The shipping weight is approximately 198 lbs. (90 kgs.).



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. Carefully remove both sections from the packing crate.
2. Once removed from package, proceed by taking off any protective wrap and unpackage the included accessories.
3. Remove the six bolts that may have been threaded into the upper section for shipping.
4. The packaging remains the property of the Customer and may be used for returning the apparatus if some repair is required.

4 Unpacking and Installation

4.2 Components

Your Shatter Index Tester machine is shipped with the following accessories and installation components. Please take a moment and identify that the following items were included:

- One air regulator/filter with fittings and manual
- Air line for connecting machine to regulator
- 1/2" mesh sand sieve
- Sand catch pan
- Sand target
- Plum bob with line and attachment screw

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

NOTICE

Do not store the device in the open and unprotected from atmospheric conditions. If this instruction is not followed, claims under warranty 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 Shatter Index Tester be mounted close to the other testing equipment. Such location should prevent the transmission of vibrations to the apparatus.

The Shatter Index Tester would likely be occupied by one operator at a time. It is used in a foundry sand laboratory.

In order to ensure ergonomically correct placement of the unit to allow the operator to comfortably load the sand sample, a ladder or other secure platform may be required due to the height of the Shatter Index Tester.

4 Unpacking and Installation

4.4 Assembly Instructions

1. Position the two coupling hubs in close proximity to each other.
2. Remove coupling nut from the unconnected pneumatic fitting.
3. Insert pneumatic tubing through coupling nut.
4. Insert pneumatic tubing with nut into pneumatic fitting as shown below in Figure 1 and hand tighten. Further tighten with wrench one half turn.



Figure 1: Showing connection of pneumatic tubing with pneumatic coupling.

5. Carefully align the two sections of the machine as shown below in Figure 2 so that the tube stripping post is aligned with the center of the base of the Shatter Index Tester.



Figure 2: Showing the coupling hubs of the two sections of the shatter index tester.

6. Insert and tighten the six hexagonal head bolts into the machined holes in the lower section of the Shatter Index Tester.
7. Slide the sand catch pan into the base slot.
8. Place the ½" mesh sand sieve into the Shatter Index Tester base sieve receiver.
9. Slide the sand target through the ½" mesh sand sieve and sand catch pan into the Shatter Index Tester base as shown below in Figure 3.

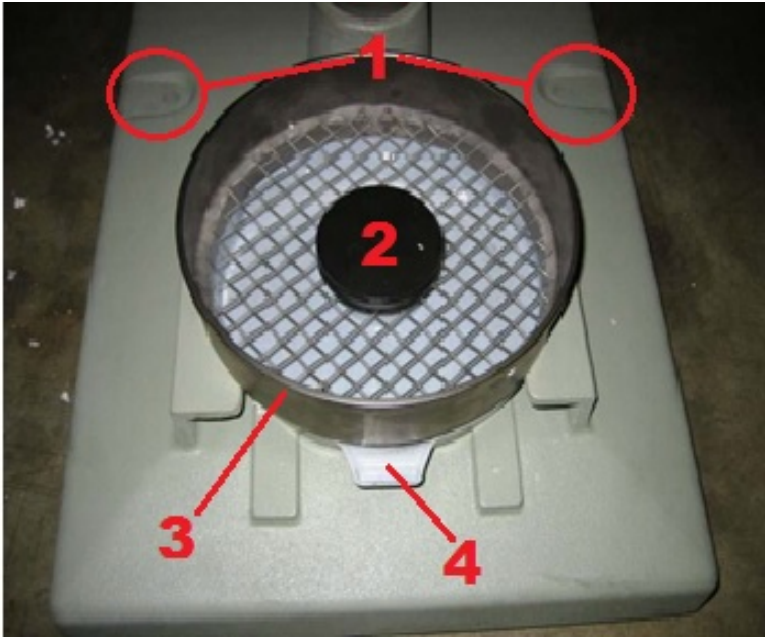


Figure 3: Shatter Index Tester base with 1/2" mesh sand sieve (3), sand catch pan (4) and target (2).

Item	Description
1	Bolt Anchoring Holes
2	Sand Target
3	1/2" Mesh Sand Screen
4	Sand Catch Pan

1. Screw the plumb bob attachment screw into the specimen tube stripping post as shown in Figure 4.

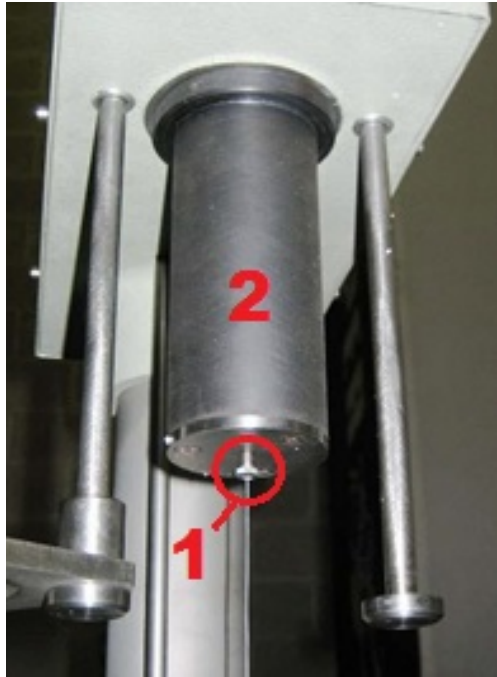


Figure 4: Plumb bob screw (1) attachment inserted into specimen tube stripping post (2).

2. Using the plumb bob as a guide, raise or lower the four adjustable rubber feet on the bottom of the Shatter Index Tester until the center of the target is in line with center of the specimen tube stripping post as shown in Figure 5.

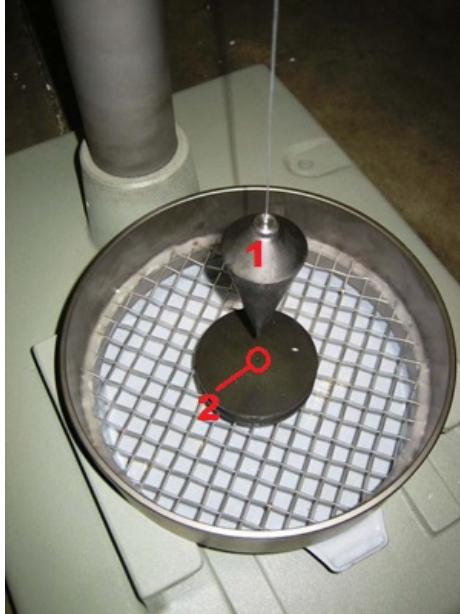


Figure 5: Showing plumb bob (1) alignment on the center of the target (2) in order to properly level the Shatter Index Tester.

3. Mark the position of the Shatter Index Tester's base anchoring holes on the floor.
4. Move the Shatter Index Tester to a safe location.
5. Drill the appropriate anchoring holes and then set the anchors.
6. Return the Shatter Index Tester to its original location and securely fasten the tester to the floor using the anchoring bolts.
7. Recheck the target/sand specimen tube alignment and repeat previous steps if necessary.



It is especially important that this machine is securely fastened to the floor. Personal injury and/or damage to the machine can result if not followed!

4.5 Pneumatic Power Connection and Set Up

Pneumatic Requirements: Dry compressed air, filtered, NON-LUBRICATED and regulated to approximately 3.5 bar (50 to 55 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 Shatter Index Tester and is the responsibility of the customer to provide and install.



The length of pneumatic tubing required to connect the Shatter Index Tester to the regulator/filter has been included with the Shatter Index Tester.

NOTICE

The compressed air should be free of dirt, debris and condensate. Debris and condensate will cause damage to the Shatter Index Tester.

1. Unpackage and assemble the provided pneumatic regulator/filter according to the original equipment manufacturer's instructions supplied with the regulator/filter.
2. Unscrew the compression air fitting from the shatter index base and, if supplied, remove the air plug as displayed in Figure 6.

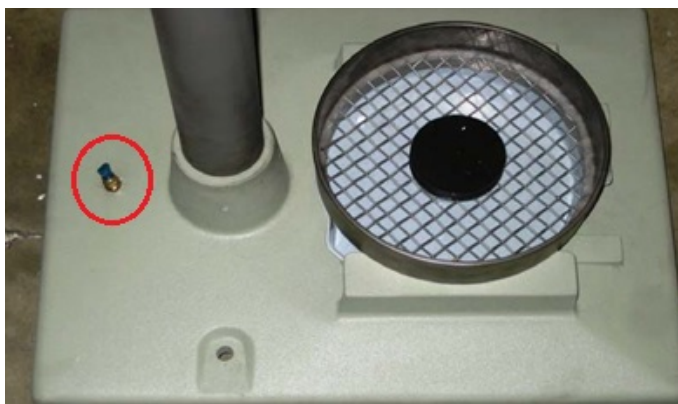


Figure 6: Air inlet of Shatter Index Tester with a factory shipped plug in place

3. Connect the assembled pneumatic regulator/filter to the incoming compressed air line.
4. Connect the Shatter Index Tester to the pneumatic regulator/filter using the pneumatic air tubing and fittings included with the unit. Connect the air tubing from the outlet of the regulator/filter to the air inlet (Figure 6) located on the base of the Shatter Index Tester. Secure the air tubing to the air inlet with the provided connector that is attached to the air inlet. Refer to the manufacturer's manual for detailed instructions.
5. Turn on the air supply. Using the supplied air regulator/filter adjust the air pressure to 3.5 bar (50-55 PSI). Refer to the manufacturer's manual for the regulator/filter for instructions on regulating air pressure.

4.6 Airborne Noise Emission

Regarding airborne noise emission by the Shatter Index Tester, there is no motor or other noise emitted by this machinery other than the sound of the cylinder ejecting the sand sample from the pneumatic tube and hitting the anvil. 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 Preparing the Sand Specimen

The shatter index test requires one (1) standard 2 in. x 2 in. AFS sand specimen (50 mm x 50 mm metric sand specimen). Manufacture a standard (AFS or metric) sand specimen using a standard sand rammer or pneumatic sand squeezer. (Simpson Technologies Model numbers: 42100, 42100-M, 42117, 42117-M, 42160 and 42160-M). Leave the sand sample in the specimen tube and record the initial sand weight.



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.

5.2 Optional AFS or DIN Specimen Tube (2" or 50 mm)

– Included Conversion Kit

The supplied machine, as ordered, is per the AFS or DIN standard. However, the Shatter Index Tester includes a conversion kit to use a DIN (or AFS) standard sand specimen tube with a diameter of 50 mm (or 2").

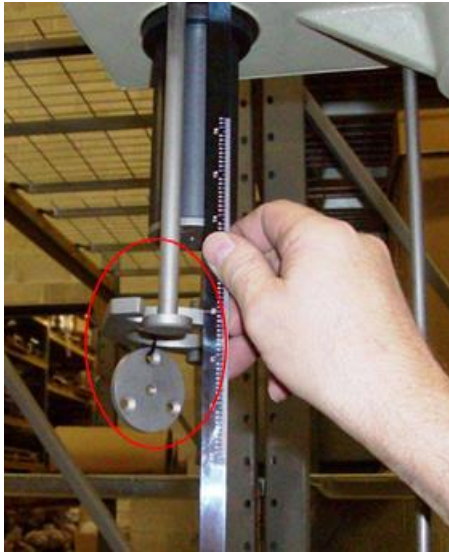


Figure 7: Optional Metric Adaptor (1)

5.3 Performing a Shatter Index Test

1. Turn on air supply and verify correct settings on air regulator.
2. Ensure that the catch pan is free from any sand or other foreign material.
3. Ensure that the sand catch pan, $\frac{1}{2}$ " mesh sand sieve and target are in their correct position on the base of the Shatter Index Tester (see Section 4.4).
4. Verify the stripping post base is in the lower load position (Figure 8). If not, pull the control rod down.



Figure 8: Shatter Index Tester stripping post base in closed lower position

Item	Description
1	Stripping Post Base (Closed Position)
2	Control Rod for Stripping Post Base



The control rod actuating positions (Up = Base up/ Down = Base down) and stripping post ejection speed have been set at the factory. Any deviation from these settings can result in serious injury!

5 Operating Instructions

5. Turn the stripping post base to its open position as demonstrated in Figure 9.

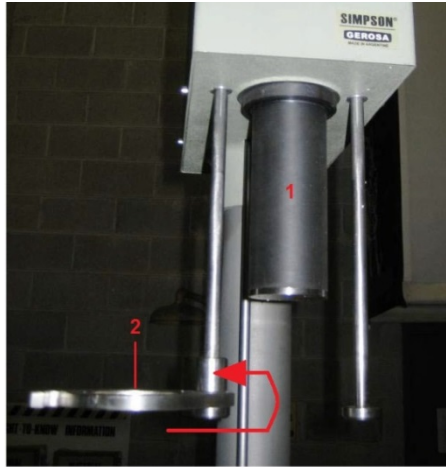


Figure 9: Stripping post base in open position (2); Stripping post (1)

6. Gently slide the 2" x 2" (50 mm x 50 mm) specimen tube with the sand sample down on the stripping post until the bottom of the specimen tube is higher than the stripping post base (Figure 10).



Figure 10: 2" x 2" (50 mm x 50 mm) specimen tube (1) positioned on the Shatter Index Tester stripping post

7. In order to lock the sand specimen tube in place, rotate the strip- ping post base back to its closed position.
8. To eject the sand sample from the cylinder, push the control rod upward. Be sure that the operator's arm will not hinder the drop- ping of the 2" x 2" (50 mm x 50 mm) sand specimen.
9. Confirm the 2" x 2" (50 mm x 50 mm) sand specimen fell squarely on the center of the target. If this did not occur, the Shatter Index Tester should be level again as described in Section 4.4.
10. Carefully lift the target and ½" mesh sand sieve, including fractured sand, from the base of the Shatter Index Tester. Be careful not to knock any more sand into the sand catch pan.
11. Remove the catch pan and weigh its contents.
12. Subtract the weight of the sand in the catch pan from the original weight of the 2" x 2" (50 mm x 50 mm) sand specimen. This is the weight of the sand remaining on the target and the ½" mesh sand sieve. Divide this weight by the total original weight of the 2" x 2" (50 mm x 50 mm) sand specimen weight and multiply by 100. This is the shatter index.

$$\text{Shatter index} = \frac{\text{Total weight of sand specimen} - (\text{wt. of sand in catch pan}) \times 100}{\text{Total weight of sand specimen}}$$

6 Maintenance

6 Maintenance



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6.1 Periodic Controls

Compressed Air

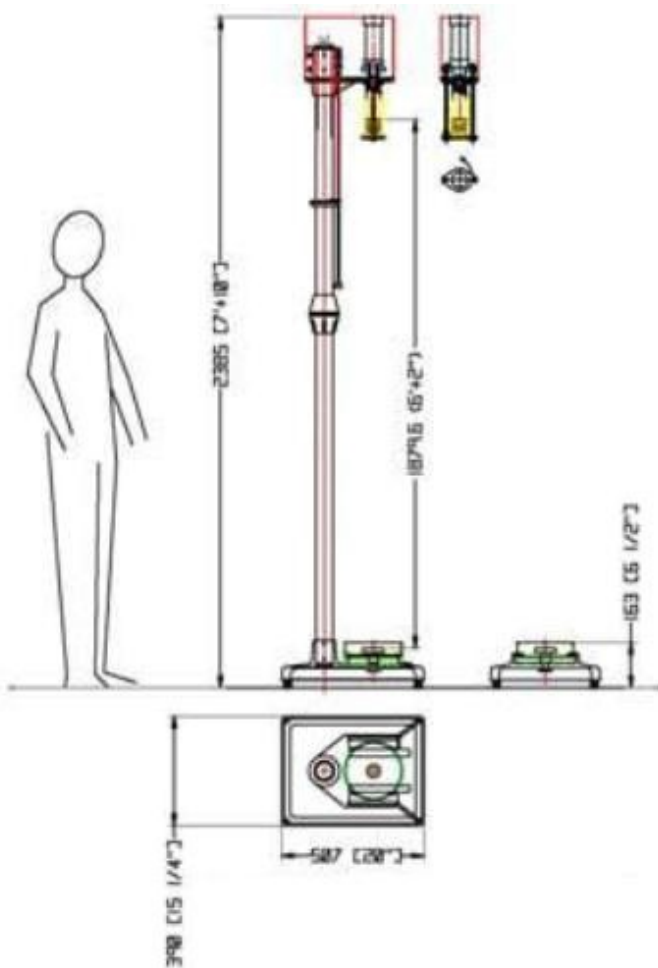
Check weekly

- Air regulator, verify correct pressure settings
- Air filter, drain out any condensate

6.2 Calibration and Maintenance

There is nothing to calibrate on the Shatter Index Tester. Because of its robust design, simple periodic cleaning of the machine is all that is required.

7 Apparatus Layout



8 Spare Parts / Ordering Parts / Returns

8.1 Spare Parts

Simpson maintains a large inventory of common spare parts for all current Simpson Analytics products. Contact Simpson Technologies with the part number and description when ordering.

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 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 Material Safety Data Sheet (MSDS) 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 personnel and follow safety procedures, applicable local policies and regulations in decommissioning the Shatter Index Tester and peripheral equipment.

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

WASTE DISPOSAL

The Machinery and Controls Consist of:

- Iron
- Aluminum
- Copper
- Plastic

Dispose of the parts in accordance with the applicable regulations.



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