Monthly Safety Notice

March 2020 National Baromedical Services, Inc.

Patient Grounding

Background

Installation of electrically operated or electrically charged medical equipment in general, and hyperbaric involving chambers in particular, requires that it is grounded to earth to eliminate/limit electrostatic accumulation and risk of discharge. In 1974, Sechrist Industries began to market an oxygen-filled monoplace hyperbaric chamber. The chamber itself was appropriately grounded at installation, consistent with the grounding of air-filled multiplace chambers. Because risk of fire from any electrostatic discharge in an oxygen environment is greater, the National Fire Protection Association eventually mandated direct physical grounding of monoplace chamber patients. In the absence of guidance from Sechrist and other monoplace chamber manufactures, end users opted for various techniques such as an ECG patch connected to the chamber door. Eventually, Sechrist was encouraged to provide a grounding device with each chamber purchase. Initially, this involved a wrist strap with snap on 1 meg ohm resistor and cable cord to a chamber ground jack located at the chamber entrance. In the early 2000's the concept of chamber operators verifying chamber and patient grounding was introduced. Various verification devices were supplied at chamber purchase and existing chambers retrofitted to accommodate this new fire safety initiative. Later versions of NFPA 99 would eventually mandate grounding checks.

The Issue

In 2018, NFPA 99 added a new section to Chapter 14 entitled *Electrostatic Safeguards. 14.3.4.6. The elimination of static charges is dependent on the vigilance of administrative supervision of materials purchased, maintenance, and periodic inspection and testing. Conductive accessories shall meet conductivity and anti-static requirements.*

Patient ground shall be verified in Class B chambers prior to each chamber operation.

Verification of patient grounding should include actual testing of ground not just a visual verification ideally the verification will include connecting the patient to the ground pathway and measuring no more than one million Ohms with a meter. This value comes from NFPA 77.

It is expected that a verification and documentation of the patient grounding will be completed prior to each treatment. It is the intent that this action be added to the pre operational safety check required by this code

EXHIBIT 14.38 *Two Examples of Patient Ground Verification. (Courtesy of Intermountain Healthcare)*

Bottom Line

If you are not currently testing patients prior to every treatment, then begin doing so now. If you need the ground rod shown in this image, order it from Sechrist Industries. Please find attached instructions and monthly chamber checks. Ensure your patient chart includes a space for pre-treatment ground verification documentation.

Attachments:

Chamber Ground Measurement and Wrist Strap Verification Test Procedure

Chamber Ground Measurement and Wrist Strap Verification Test Procedure

MONOPLACE HYPERBARIC CHAMBERS

MODELS 3600E/ER, 3300E/ER,3200/R

2800/R ,3300H/HR, 3600H/HR AND

4100H/HR

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Anaheim, CA 92807, USA
Phone: (714) 579-8400
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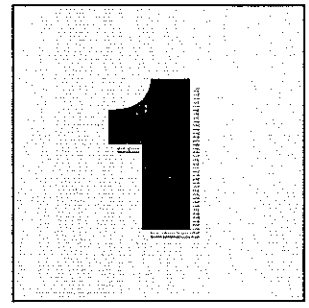
p/n 150177 Rev 0

SECHRIST INDUSTRIES, INC.
MONOPLACE HYPERBARIC CHAMBER
MODELS 3600E/ER, 3300E/ER,3200/R 2800/R ,3300H/HR

3600H/HR AND 4100H/HR

Chamber Ground Measurement and Wrist Strap Verification Test Procedure

Chapter 1 – Introduction



This procedure will verify and test that the Chamber meets the following NFPA regulations.

EQUIPMENT:

NFPA 99 – 2012 Edition

14.2.7.4.1.3
The resistance between the grounded chamber hull and the electrical ground shall not exceed 1 ohm.

NFPA 77 – 2007 Edition

7.4.1.3
To prevent the accumulation of static electricity in conductive equipment, the total resistance of the ground path to earth should be sufficient to dissipate charges that are otherwise likely to be present. A resistance of 1 megohm or less is generally considered adequate.

7.4.1.3.1
Where the bonding/grounding system is all metal, resistance in continuous ground paths typically is less than 10 ohms. Such systems include those having multiple components. Greater resistance usually indicates that the metal path is not continuous, usually because of loose connections or corrosion.

6.8.4
Periodic inspection and testing of bonding and grounding systems are equally important. Proper inspection and testing ensure that the chances for a static electric charge to accumulate are minimized.

6.8.6
The resistance to ground is measured with an ohmmeter or a megohmmeter.

PATIENT:

NFPA 99 – 2012 Edition

14.3.1.5.3.2
In Class A and Class B chambers with atmospheres containing more than 23.5 percent oxygen by volume, electrical grounding of the patient shall be ensured by the provision of a high-impedance conductive pathway in contact with the patient's skin.

NFPA 77 – 2007 Edition

7.6.3.3
The simplest type of commercial device is a grounding bracelet with a built-in resistor typically giving a resistance to ground of about 10^6 ohms for shock protection.

7.6.3.4
Ground continuity should be checked periodically to the manufacturer's specified limits using a voltmeter or volt ohmmeter or a commercial tester.

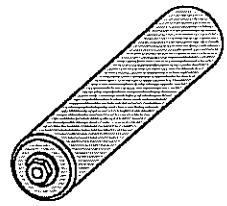
IEC 61340-4-6 Edition 1.0 2010-01

5.11.4
A value of ≤ 10 mΩ or a reading falling within the user-specified resistance range indicates that the wrist strap system is acceptable to use.

EQUIPMENT LIST:

1) Digital Multimeter (DMM)

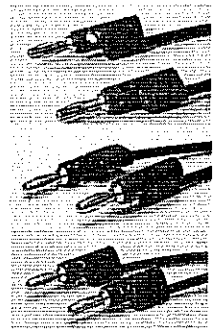
2) Patient Ground Test Rod



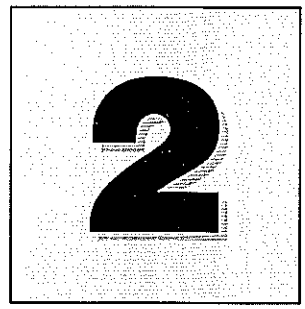
3) Green Test Cable

4) Red Test Cable

5) Black Test Cable



Chapter 2 – Chamber Stud to Wall Measurement



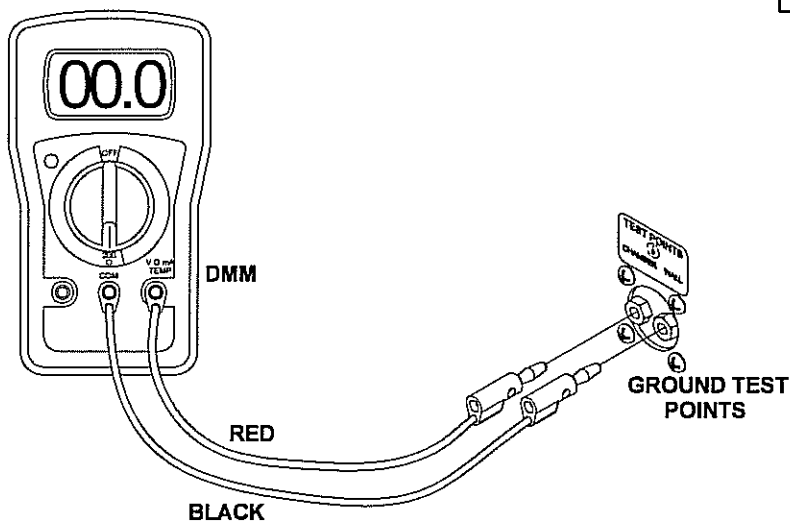


FIGURE 1

Step 1: Connect the red test cable to V•Ω•mA jack.
Step 2: Connect the black test cable to COM of the DMM.
Step 3: Connect the other end of the red test cable to the chamber ground test point jack labeled Chamber.
Step 4: Connect the other end of the black test cable to the chamber ground test point jack labeled Wall.
Step 5: Turn the dial on the DMM to **200 Ω.**
Step 6: Record the reading as shown on LCD display.

Acceptance Criteria: Reading should be between 0 and 1 Ω, to meet requirements specified in NFPA99-2012 Edition Section 14.3.5.3.2.3

IMPORTANT: After using the DMM, turn the dial to OFF position to conserve battery. Battery will discharge if not turned off.

Chapter 3 – Chamber Patient Ground Jack to Chamber Stud Ground Measurement

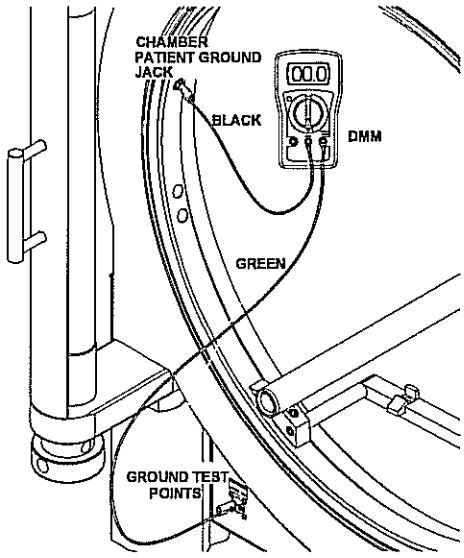


FIGURE 2
Door Ring Ground Jack Location

OR

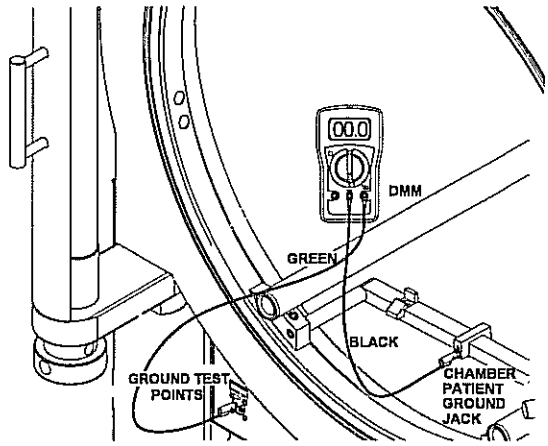


FIGURE 3
Latch Bar Ground Jack Location

OR

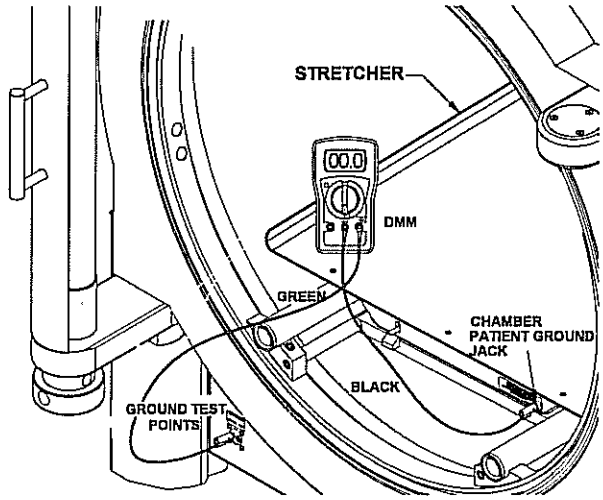


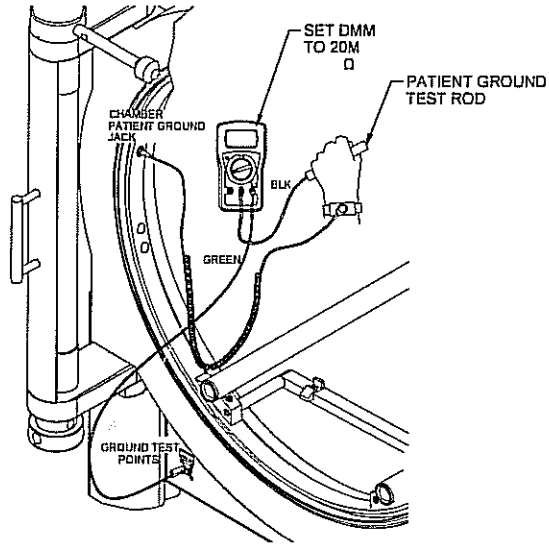
FIGURE 4
Stretcher Ground Jack Location

Step 1: Connect the green test cable to V•Ω•mA jack.
Step 2: Connect the black test cable to COM of the DMM.
Step 3: Connect the other end of the black test cable to the chamber Patient Ground jack.
Step 4: Connect the other end of the green test cable to the chamber ground test point jack labeled Chamber.
Step 5: Turn the dial on the DMM to **200 Ω.**
Step 6: Record the reading as shown on LCD display.

Acceptance Criteria: Reading should be between 0 and 10 Ω, to meet requirements specified in NFPA77-2007 Edition Section 7.4.1.3.1

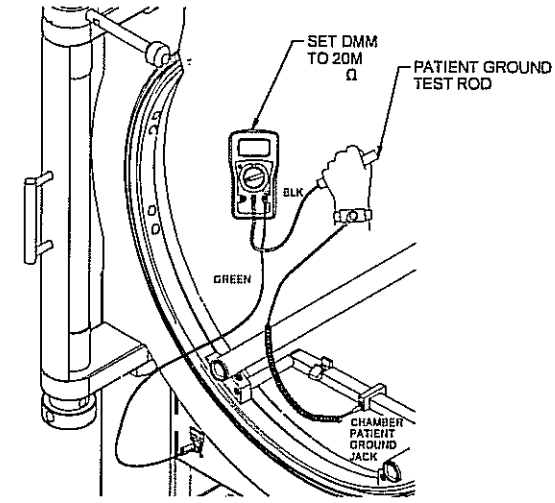
IMPORTANT: After using the DMM, turn the dial to OFF position to conserve battery. Battery will discharge if not turned off.

Chapter 4 – Wrist Strap to Chamber Test Point Ground Test using DMM.

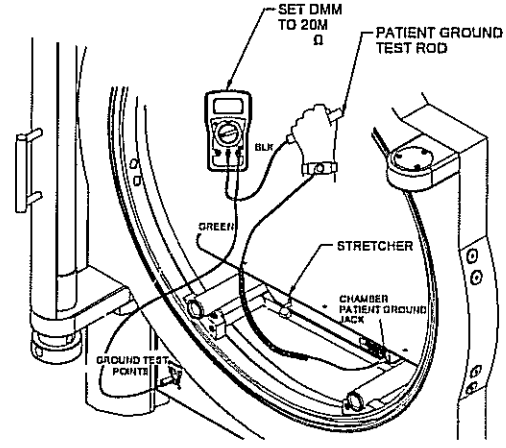


Patient ground jack located on Door Ring

OR



Patient ground jack located on latch bar.



Patient ground jack located on stretcher.

Step 1: Wear wrist strap.
Step 2: Connect wrist strap plug to Chamber Patient Ground jack.
Step 3: Connect the green test cable to V•Ω•mA jack of the Sechrist provided DMM.
Step 4: Connect the other end of green test cable to the Chamber Ground Test point jack labeled Chamber.
Step 5: Connect the black test cable to COM of the DMM and the other end of the test cable to the Patient Ground Test rod.
Step 6: Set the DMM dial to 20MΩ.
Step 7: Grasp the Patient Ground Test rod with the hand wearing the wrist strap.
Step 8: Obtain resistance reading from DMM display.

Note: If no resistance reading obtained from DMM, the patient is not grounded.

Hyperbaric Medicine Service
Monthly Chamber Checks

Chamber Model and Serial #: _____

Date	Ground Record value of chamber ground. (Not to exceed 1 Ω ohm)		Cycle Counter Record monthly value on chamber cycle counter		Initials
	Chamber Test Points	Patient Ground Jack	Past Month	New Total	

Refer to Sechrist –Chamber Ground Measurement and Wrist Verification Test Procedure for instructions