

# Surface Resistance Checker Installation, Operation and Maintenance



Made in the  
United States of America



Figure 1. Desco 19640 Surface Resistance Checker

## Description

The Desco 19640 Surface Resistance Checker is a portable battery powered checker fitted with built-in parallel electrodes that allow for tests of material surface resistance. This checker is designed for quick checks of surface resistance for ESD control applications in electronics manufacturing or handling environment. The Surface Resistance Checker is equipped with an automatic test voltage selector. The test voltage will switch from 10V to 100V should the measured resistance exceed  $1 \times 10^5$  ohms. Two banana jacks and an electrode toggle switch allow for the connection of two external 5 pound electrodes that measure surface resistance point to point (Rtt).

Note: The Desco 19640 Surface Resistance Checklist is intended for quick-check applications only. Use the Desco 19290 Digital Surface Resistance Meter for applications that require more precision.

ESD protected area products should be tested:

- A. Prior to installation to qualify for listing in user's ESD control plan. Approved ESD materials (see product qualification table at ANSI/ESD S20.20 Table 3 EPA ESD control items).
- B. During initial installation.
- C. For periodic checks of installed products as part of ANSI/ESD S20.20 Compliance Verification testing per ESD TR53.

### Compliance Verification Plan

"A Compliance Verification Plan shall be established to ensure the Organization's fulfillment of the technical requirements of the ESD Control Program Plan. Process monitoring (measurements) shall be conducted in accordance with a Compliance Verification Plan that identifies the technical requirements to be verified, the measurement limits and the frequency at which those verifications shall occur. The Compliance Verification Plan shall document the test methods and equipment used for process monitoring and measurements. If the test methods used by the Organization differ from any of the standards referenced in this document, then there must be a tailoring statement that is documented as part of the ESD Control Program Plan. Compliance verification records shall be established and maintained to provide evidence of conformity to the technical requirements.

The test equipment selected shall be capable of making the measurements defined in the Compliance Verification Plan." (ANSI/ESD S20.20 section 7.3) The Surface Resistance Checker is not recommended for use in Resistance to Ground (Rtg) measurements.

The Surface Resistance Checker and its accessories are available as the following item numbers:

Item	Description
<a href="#">19640</a>	Surface Resistance Checker
<a href="#">19641</a>	Test Leads, 1 Pair
<a href="#">50003</a>	Five-Pound Electrodes, 1 Pair
<a href="#">50005</a>	Concentric Ring Probe

## Packaging

- 1 Surface Resistance Checker
- 1 9V Battery
- 1 Certificate of Calibration

## Features and Components

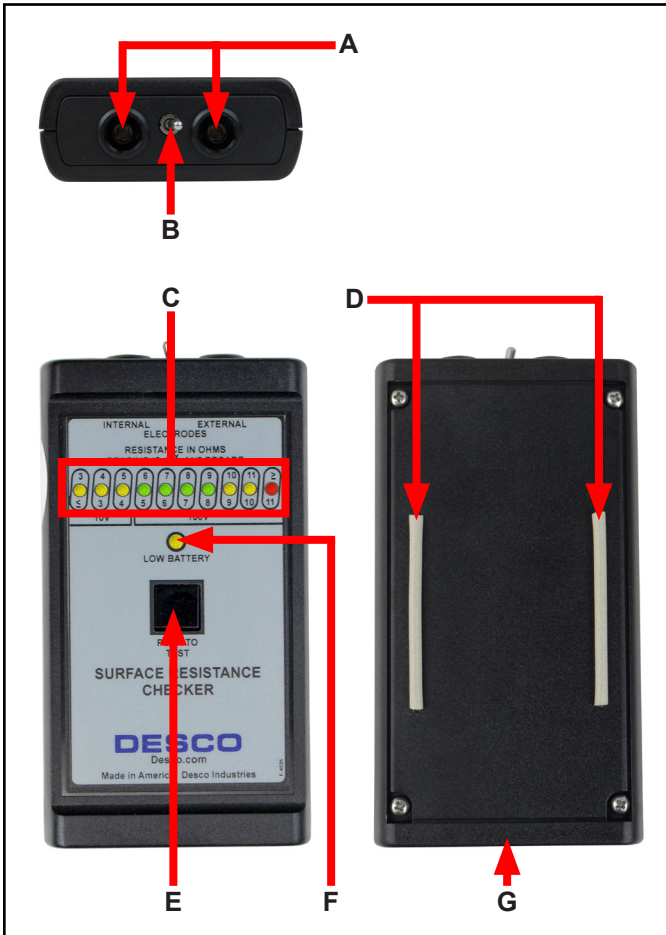


Figure 2. Surface Resistance Checker features and components

**A. Electrode Banana Jacks:** Insert the test leads from the optional 5 pound electrodes here.

**B. Electrode Toggle Switch:** Toggle the switch to INTERNAL to measure with the parallel electrodes located on the back of the Surface Resistance Checker. Position the switch to EXTERNAL to measure with optional 5 pound electrodes (not included).

**C. Resistance Measurement LEDs:** The resistance is measured in ohms and read as  $10^X \pm 1/2$  decade where X is the range illuminated on the checker.

**D. Parallel Electrodes:** Ensure that the electrode toggle switch is set to INTERNAL when choosing to take a measurement with these electrodes.

**E. Test Switch:** Use this switch to make a surface resistance measurement. Push and hold until one of the resistance measurement LEDs remains illuminated.

**F. Low Battery LED:** Replace the battery when this battery illuminates during use. Do not use the Surface Resistance Checker when this LED illuminates.

**G. Battery Compartment:** Remove the cover to allow access to the 9V battery compartment.

## Operation

### USING THE PARALLEL ELECTRODES

#### Measure Resistance Point-to-Point (R<sub>tt</sub>) on the Surface

1. Do not clean the surface.
2. Remove from the surface only those items that might interfere with the test. ESD sensitive devices shall also be removed.
3. Place the Surface Resistance Checker on the most commonly used area of the surface. The parallel electrodes should be 2" away from any edge and 3" away from any grounded point. If the most used area is not obvious, use two points near the center of the surface.
4. Toggle the electrode switch located at the top of the Surface Resistance Checker to INTERNAL.
5. Push and hold the test switch until the measurement is displayed on one of the Resistance Measurement LEDs.
6. Perform additional measurements by placing the electrode on the most commonly used or worn area.

NOTE: When taking multiple measurements, allow 1-2 seconds between measurements. Pushing the test switch too quickly will result in an error.

If the measurement is outside acceptable limits, clean the surface with an ESD cleaner containing no insulative silicone such as Desco 10435 Reztore® Surface & Mat Cleaner, and re-test to determine if the cause of failure is an insulative dirt layer or the ESD worksurface material.



Figure 3. Using the parallel electrodes to measure surface resistance

## USING THE OPTIONAL TEST LEADS AND ONE OR TWO 5 POUND ELECTRODES

### General Guidelines

Use both 5-pound electrodes for Resistance Point-to-Point (Rtt) measurements.

Use one 5-pound electrode, and connect one test lead to ground for Resistance-to-Ground (Rtg) measurements.

Ensure that the item being measured is electrically isolated (placed on an insulative surface). The checker will measure the lowest resistance path.

Minimize crossing the test leads when possible.

When using 5-pound electrodes:

- Place them no closer than 2" from the edge of the surface being measured.
- Place them no closer than 3" to any groundable point.
- Place them about 10" apart from each other for Rtt measurements of a worksurface.
- Place them about 3' apart from each other for Rtt measurement of a floor.

Preferable electrode placements include:

- Most commonly used area of a surface
- Most worn area
- Center of surface
- Furthest area from a grounded point

If the surface to be measured has sections (i.e. floor tiles, garment panels), place the 5-pound electrodes on different sections for Rtt measurements.

Clean the material's surface for test lab measurements, but do not clean the surface for materials that are already installed. Only clean and re-test the installed material if failure occurs.



Figure 4. Using the 19641 test leads and 50003 five-pound electrodes to measure Rtt

### Frequency of Compliance Verification Testing

NOTE: "The frequency of periodic testing is normally specified in corporate operating procedures. ... The frequency of testing is driven by the amount of risk exposure that can occur between tests. For, example, what is the quantity of product handled between test periods?" (See ESD Handbook ESD TR20.20)

Per ANNEX A of Compliance Verification ESD TR53 "Test Frequency, The objective of the periodic test procedures listed in this document is to identify if significant changes in ESD equipment and materials performance have occurred over time. Test frequency limits are not listed in this document, as each user will need to develop their own set of test frequencies based on the critical nature of those ESD sensitive items handled and the risk of failure for the ESD protective equipment and materials."

Additional information includes:

- **Worksurface** - at least quarterly (see ESD TR20.20 section 5.3.1.13 Periodic Tests)
- **Footwear** - "Incoming inspection on a lot sampling basis should be performed for all static control footwear." (see ESD TR20.20 section 5.3.3.4 Testing)
- **Floor** - "The types of monitoring and type of equipment are considerations. In some cases, a simple electrical resistance test with a megohmmeter may suffice. In others, a static charge generation test may be required." (see ESD TR20.20 section 5.3.4.13 Performance Monitoring)
- **Seating** - "The recommended electrical resistance range for seating is less than  $1 \times 10^9$  ohms as tested in accordance with ANSI/ESD STM 12.1. This value should be during acceptance testing, installation and periodically thereafter." (see ESD TR20.20 section 5.3.5.3 Testing)
- **Garments** - "To maintain process control, it is imperative that the garment be tested per ANSI/ESD STM 2.1. The point-to-point and sleeve-to-sleeve resistance test should be made." (see ESD TR20.20 section 5.3.13.3.1.8 Periodic Testing)

## Maintenance

The area surrounding the cable jacks at the top end of the checker should be wiped with a clean cloth moistened with alcohol to remove skin oils that will accumulate and affect the accuracy at high resistances. The frequency of cleaning will depend on usage; once a month would be a good starting point.

Per ANSI/ESD S4.1 "Clean the electrodes with a minimum 70% isopropanol-water solution." Make sure the conductive pads are dry prior to use.

See specific product test standard for test lab specimen cleaning instructions. Per ANSI/ESD S4.1 Worksurfaces "The test specimens and electrodes shall be cleaned twice with a minimum 70% isopropanol-water solution using a clean, low-linting cloth each time." (Then conditioned for a minimum of 72 hours).

For compliance verification testing, do not clean surfaces. However, if any measurements lie outside acceptable range, then clean the material's surface and re-test.

Note: For worksurfaces, use Desco 10435 Reztore® Surface & Mat Cleaner or another silicone-free ESD cleaner. Be sure the surface is dry before testing.

The Surface Resistance Checker requires little maintenance, and there are no user serviceable parts. If your unit requires service beyond cleaning the electrodes or replacing the batteries, please contact [Desco Customer Service](#).

## Specifications

Operating Temperature	50 to 95°F (10 to 35°C)
Environmental Requirements	Indoor use only at altitudes less than 6500 ft. (2 km) Maximum relative humidity of 80% up to 85°F (30°C) decreasing linearly to 50% @ 85°F (30°C)
Dimensions	5.2" L x 2.9" W x 1.1" D (132 mm x 74 mm x 28 mm)
Weight	0.4 lbs. (0.2 kg)
Country of Origin	United States of America

## Accuracy

The Desco Surface Resistance Checker is calibrated to ensure that the proper LEDs illuminate when their corresponding load resistances are applied. All load resistances shown below have a  $\pm 10\%$  accuracy. No claims are made for the actual resistance values that trigger the change in LEDs.

LED	$\leq 3$	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	$\geq 11$
Load	1 k $\Omega$	10 k $\Omega$	100 k $\Omega$	1 M $\Omega$	10 M $\Omega$	100 M $\Omega$	1 G $\Omega$	10 G $\Omega$	100 G $\Omega$	1 T $\Omega$

### Limited Warranty, Warranty Exclusions, Limit of Liability and RMA Request Instructions

See the Desco Warranty - [Desco.com/Limited-Warranty.aspx](https://www.desco.com/Limited-Warranty.aspx)