



A COMPREHENSIVE GUIDE TO MEASURING ESD

Maximising ESD Protection in Industrial Workstations

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**To achieve a reliable level of static charge management,
the workstation itself must be measured on site.**



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ESD STANDARDS

The purpose of ESD standards is to prevent damage to electronic devices caused by electrostatic discharge. These standards provide guidelines and procedures for the handling, storage, use and measuring of electronic devices.



Acceptable measurement values, together with instructions on how to measure, are defined in the following ESD standards:

- IEC 61340-5-1
- IEC 61340-2-3



In accordance with the standards:

- If surface resistance $< 1\text{ M}\Omega$, measuring voltage **10 V**
- If surface resistance $\geq 1\text{ M}\Omega$, measuring voltage **100 V**

GOOD TO KNOW BEFORE MEASURING

Before you measure, there are a few things you should be aware of:



Air humidity

Air humidity can have a significant impact on ESD control. Low humidity levels, in particular, can make materials more static-prone, as they become depleted of moisture.



Dirt

If the surface being measured is contaminated with dirt or other substances, this can act as a conductor or insulator, changing the results of the measurement.

For example, if the surface (desktop, floor, etc.) becomes contaminated, its resistance may increase and ESD protection may be weakened.



Cleaning

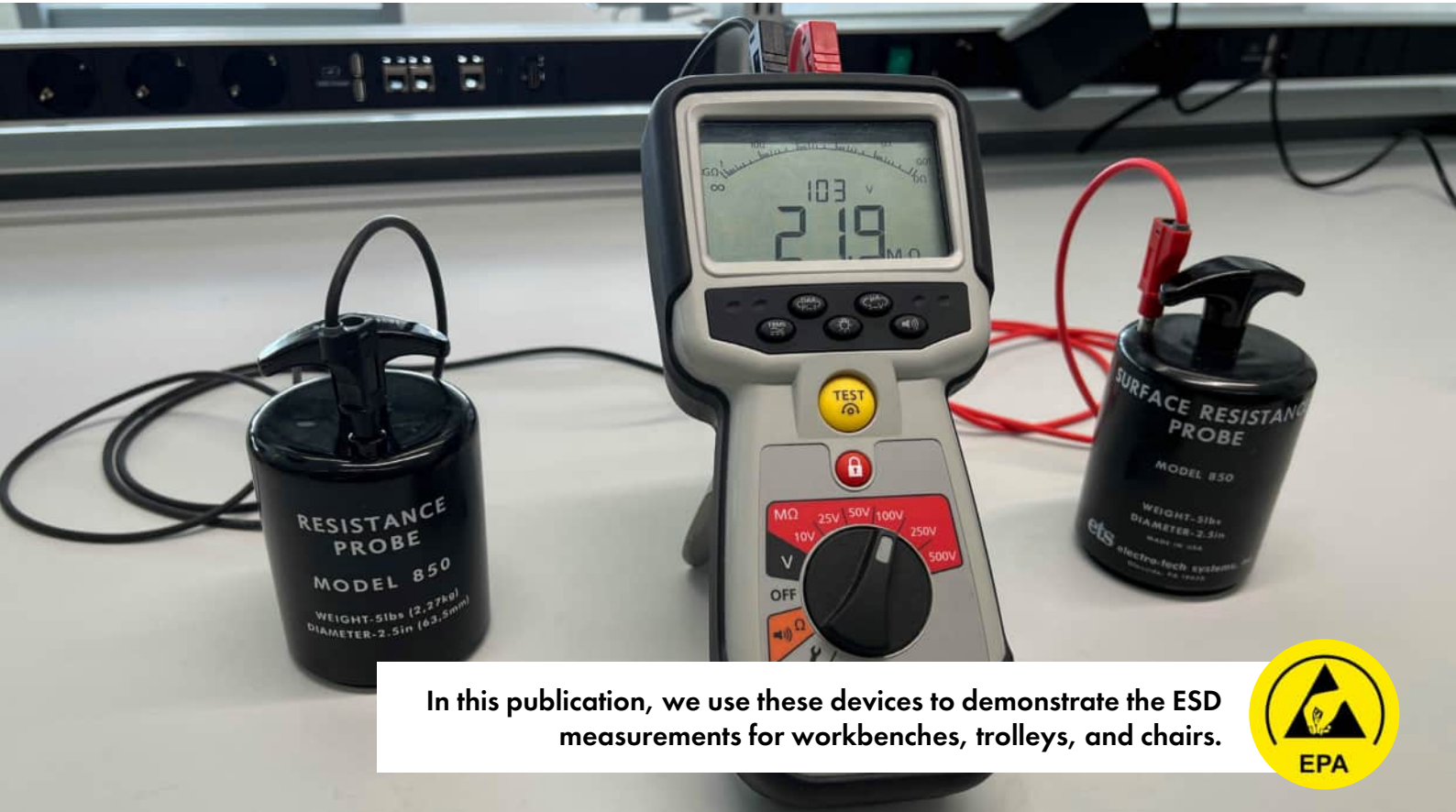
It is important to regularly clean and maintain ESD controlled environments and equipment to ensure accurate ESD measurements and minimise the risk of ESD events.

Commonly used detergents contain wax components. Wax creates an insulative layer on surfaces like tabletops and floors. **Make sure that you always use ESD-compatible detergents.**



MEASURING EQUIPMENT

By measuring the ESD resistance of materials and surfaces, we can ensure that they are effective in preventing or mitigating the effects of ESD. Accurate measurement of ESD resistance can also help identify potential hazards and improve safety measures to protect workers and equipment.



In this publication, we use these devices to demonstrate the ESD measurements for workbenches, trolleys, and chairs.



ESD insulation tester and resistance probes

An ESD insulation tester is used to measure the surface resistance of the EPA area. That information is used to assess the effectiveness of ESD protection materials in blocking electrical current, which is essential for ensuring the safety and reliability of electronic devices.

The tester applies a voltage to the insulation and measures the resulting current flow, which is used to calculate the insulation resistance.

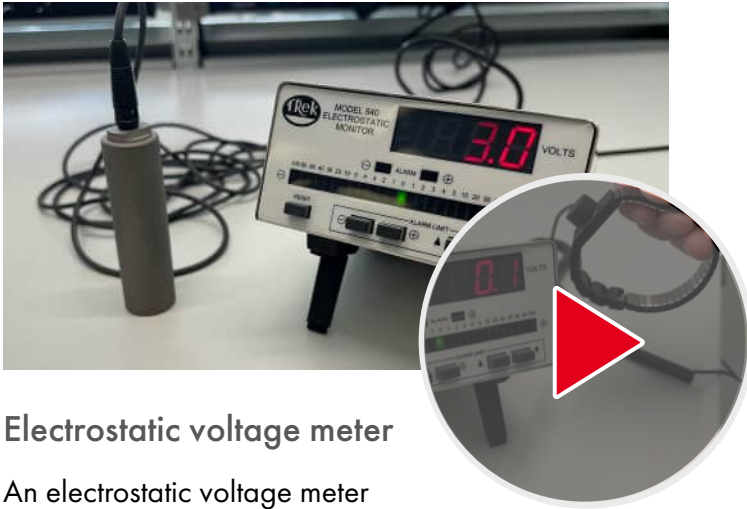
This information can help identify potential problems with dissipative materials that could cause problems in static charge management.

ESD resistance probes are devices used to measure the electrical resistance of a surface of a material.

The probes typically consist of two contact points, which are placed on the surface being tested. A voltage is applied to the contact points, and the resulting current flow is measured to determine the resistance of the material.

Other measuring methods

In addition to the ESD insulation tester and probes, it is good to know that there are also other kinds of devices available. On this page, we have gathered some examples.



Electrostatic voltage meter

An electrostatic voltage meter can measure charge voltages accumulated in the body. In the picture, a walking adapter functions as a measuring head.

Take a look at how effective the protective wristband really is

[WATCH THE VIDEO >>](#)



Different kinds of ESD probes

It is good to know that there are different-looking probes on the market. Here we have gathered a few examples of what they might look like.



Miniature measuring probes

If the measurement or contact area is awkwardly shaped or really small, miniature probes are a better solution than general probes.

Ideal for: conveyor belts, plastic bins, or small component trays or assembly stands.



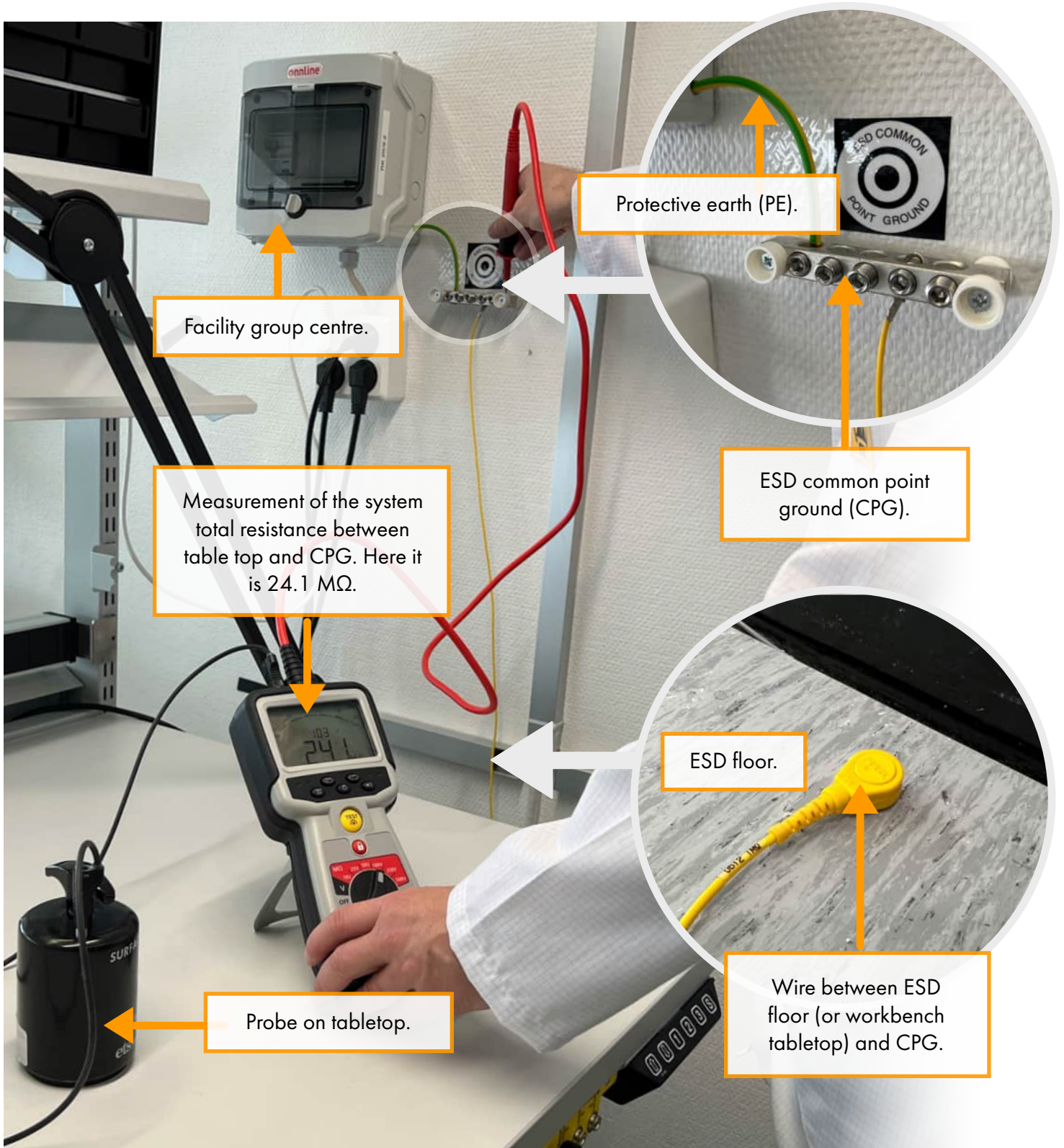
Electrostatic field meter

An ESD field meter is a device used to measure the strength of an electric field surrounding a charged object or surface. The ESD field meter helps to prevent potential damage by enabling the identification of areas with high levels of electrostatic charge.

Insulators must be measured using a field meter. IEC 61340-5-1 defines allowed values/distances. As a rule of thumb: 5000 V/m.

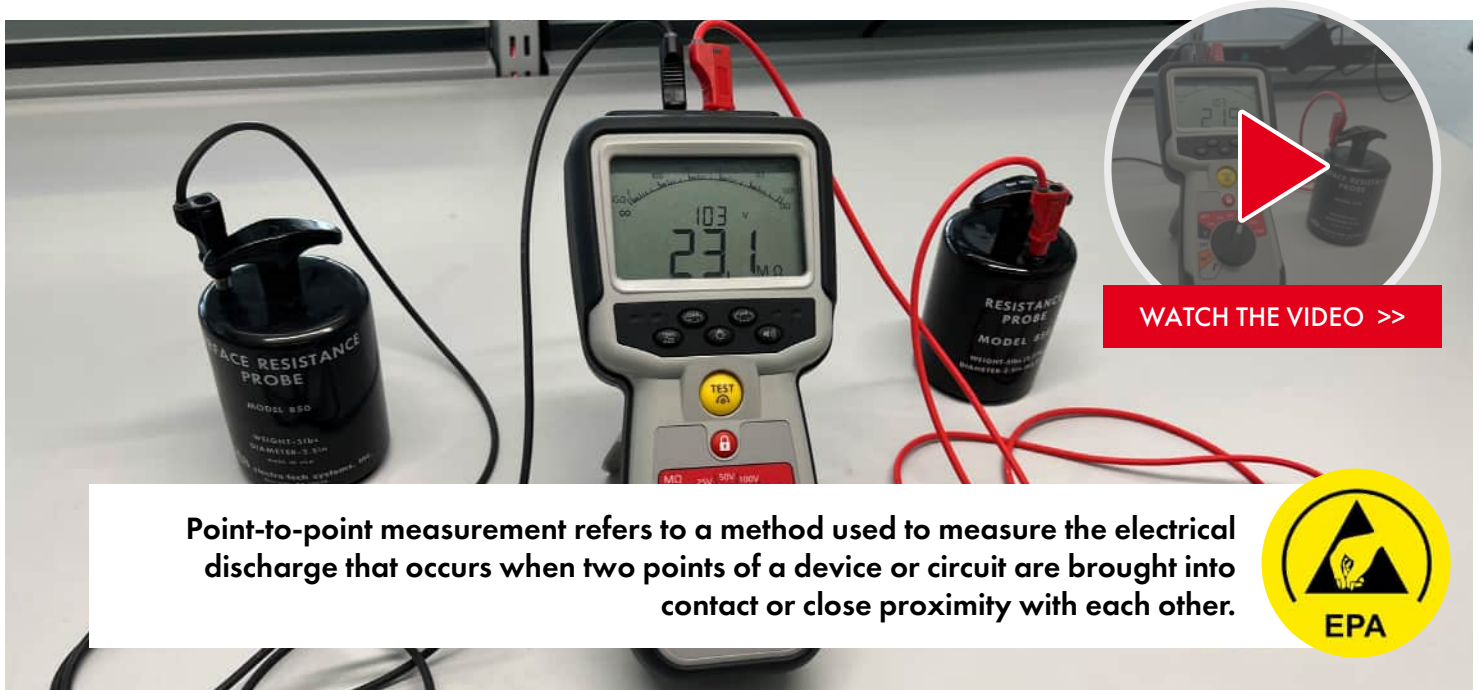
COMMON POINT GROUND

A common point ground (CPG) is a connection point that connects the ESD floor and possible workbench ESD ground potential(s). The common point ground is wired to the ESD ground potential of the facility or protective earth (PE).



WORKBENCH TABLE TOPS

An effective way to measure the resistance on tabletops and other working surfaces is to use point-to-point measurement. On workbenches, the optimal point-to-point resistance (rp-p) should be $< 1 \times 10^9 \Omega$.



WORKBENCH SHELVES

If the workbench includes shelves or other platforms, they need to be measured, too. Use point-to-point measurement for this purpose, as well.



Between the shelf and the table, the optimal point-to-point resistance (rp-p) should be $< 1 \times 10^9 \Omega$.



TROLLEYS

Measuring trolleys is slightly more complex than measuring workbenches, since they are moved around and therefore have wheels touching the ground.



Step 1 - Use the metal plate under the wheel

When measuring ESD on trolleys, it is recommended to use a metal plate under the wheel to provide a conductive surface that can simulate the conductivity of the floor. This is because the ESD performance of a trolley can be affected by the type of floor on which it is used.

Note: The wheel and the ESD floor work as a pair. This means that the same wheel may not be optimal with different floor materials.



Step 2 - Measure between the ESD floor and the trolley

Use point-to-point measurement on the trolley and the floor in the same way as with tabletops or shelves. Rp-p should be $< 1 \times 10^9 \Omega$.



Step 3 - Measure between the common point ground (CPG) and the trolley

Place the probe on the trolley and then measure resistance to the common point ground. Rgp should be $< 1 \times 10^9 \Omega$.



Ensure that the trolleys wheels are clean

Begin by removing any visible dirt from the wheels using a clean cloth. Dip a clean cloth into the ESD cleaning detergent, and wipe the wheels of the trolley with the damp cloth. Wipe the wheels of the trolley again to remove any soap residue.

- **Tip:** Using a sticky mat can effectively prevent the spread of contaminants into critical areas on shoes or the wheels of a trolley.
- **Note:** Allow the wheels to air dry completely before using the trolley.

CHAIRS

ESD chairs typically have special materials in the seat and backrest that dissipate static electricity and prevent the build-up of static charges.



Use point-to-point measurement when measuring ESD-compatible chairs. Rp-p should be $< 1 \times 10^9 \Omega$.