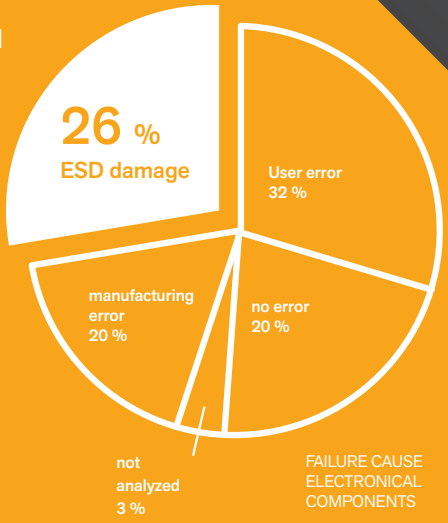
WHAT IS

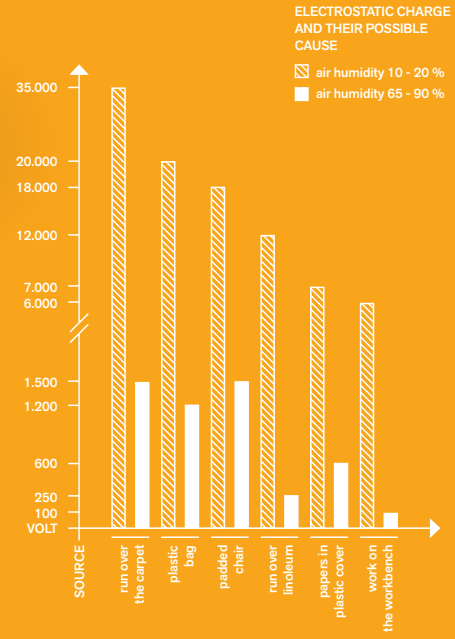
ESD

AND WHY THE PROTECTION AGAINST IT IS SO IMPORTANT!



BERNSTEIN
TOOLS FOR ELECTRONICS


POTENTIAL
EQUALIZATION


ELECTROSTATIC CHARGE
AND THEIR POSSIBLE
CAUSE
air humidity 10 - 20 %
air humidity 65 - 90 %
35.000
20.000
18.000
12.000
7.000
6.000
1.500
1.200
600
250
100
VOLT
SOURCE
run over the carpet
plastic bag
padded chair
run over linoleum
papers in plastic cover
work on the workbench

ESD – THE INVISIBLE DANGER

WHAT DOES ESD MEAN?

ESD stands for **E**lectro **S**tatic **D**ischarge. It is caused by the sudden equalisation of charge between objects with a different charge potential. This discharge can generate a large amount of electrical current.

HOW IS ELECTROSTATIC CHARGE GENERATED?

Every object has positive and negative elementary particles. Positive and negative charges normally neutralise each other. Objects are electrically neutral. However, if an object loses electrons, an imbalance arises.

This imbalance is called the charge potential. Charged objects have a tendency to equalise by discharging. In the event of a sudden discharge, high currents flow in a small electronic component.

ELECTROSTATIC DISCHARGE IN EVERYDAY LIFE

The most visible form of electrostatic discharge is lightning during a storm, when clouds with different potentials abruptly discharge. All of us have at one point experienced a sudden discharge, such as after walking across a carpeted floor and then touching the handle of a door.

CAR DOOR

DOOR HANDLE

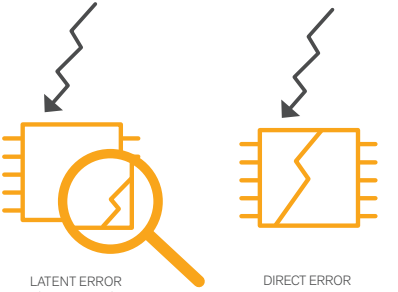
GREETING

COMPONENT SENSITIVITY

The ESD sensitivity of electronic components is rising as component parts are increasingly miniaturised. Moreover, even smaller components offer less and less space for protective circuits on microchips. In order to save energy, components need to get by on less power. A discharge of just 50 volts is enough to cause damage to a blue LED, for example. SMDs are already at risk at voltages of more than 100 volts. In contrast to this, the human ability to perceive ESD is very limited. Discharges can only be felt from voltages of 3500 Volt, audible from 4500 volts and visible from 10000 volts.

DETECTING AND ELIMINATING ERRORS

ESD damage to components is normally not visible to the naked eye. Even tiny discharges can lead to complete failure. These direct errors can usually be identified during quality control. So-called latent errors are especially critical, as they only become apparent when products are in operation. The time and effort needed to eliminate these intrinsic errors cause the greatest costs. ESD damage generally concerns latent damage. It is therefore absolutely essential that the appropriate precautions are taken.



ESD – HOW TO PROTECT YOURSELF AND YOUR COMPONENTS

You can protect ESD-sensitive components by storing, handling and packing them in a completely EDS protected environment. Precautionary measures are taken in these areas to eliminate electrostatic build-up.

The difference in potential is neutralised by slowly dissipating the charge, thereby preventing a sudden discharge. This abrupt release constitutes the real danger. A very short and rapid discharge generates a very high discharge current.

WHAT DOES THE NORM SAY?

DIN-EN61340-5-1/VDE0300
„Protection of electronic devices from electrostatic phenomena" General requirements;

DIN-EN61340-5-2/VDE0300
„Protection of electronic devices from electrostatic phenomena", User guide;

DIN-EN61340-2-1/VDE0300
„Measurement methods – Ability of materials and products to dissipate static electric charge";

DIN-EN61340-4-1/VDE0300
„Standard test methods for specific applications – Electrical resistance of floor coverings and installed floors";

DIN-EN61340-4-3/VDE0300
„Standard test methods for specific applications – footwear";

DIN-EN61340-4-5/VDE0300
„Standard test methods for specific applications – Methods for characterizing the electrostatic protection of footwear and flooring in combination with a person".

SYMBOLS AND THEIR MEANING

ESD GROUNDING POINT

indicates grounding point for all ESD components

ESD SAFE

indicates ESD safe tools and objects

ESD ENDANGERED

indicates endangered components and domains

ESD PROTECTION EQUIPMENT (ESD Protected Area)

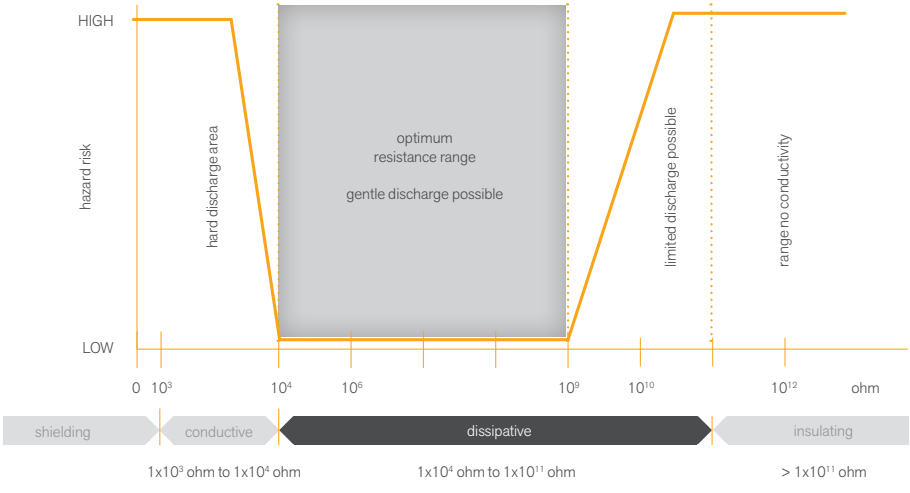
indicates ESD protected material

SURFACE RESISTANCES

The effectiveness of materials is classified according to their resistance properties. Here, surface resistance plays a particularly important role: it is the electrical resistance of a conductive layer on the surface. Depending on the resistance properties, a distinction is made between shielding materials, electrically conductive materials, electrically dissipative materials and insulating materials.

MEASUREMENT OF RESISTANCES IN THE ESD AREA

In addition to surface resistance, the following resistances are also important: the bleeder resistance (resistance against earth/protective conductor), volume resistance (resistance measured at opposite points of a material) and point-to-point resistance (resistance between two electrodes).


HIGH
hazard risk
LOW
hard discharge area
optimum
resistance range
gentle discharge possible
limited discharge possible
range no conductivity
0
10³
10⁴
10⁶
10⁹
10¹⁰
10¹²
ohm
shielding
conductive
dissipative
insulating
1x10³ ohm to 1x10⁴ ohm
1x10⁴ ohm to 1x10¹¹ ohm
> 1x10¹¹ ohm

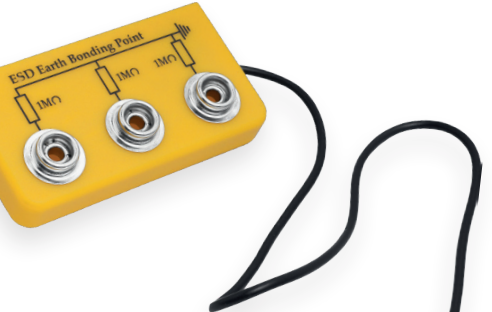
HOW TO SET UP YOUR WORKPLACE IN A ESD-SECURE WAY

PERSONS AND WORKPLACES EQUIPMENT

If ESD-sensitive components are being handled, people and workplace equipment need to be ESD compliant. The primary focus for people is ESD-compliant clothing (shoes, coats, antistatic wrist straps), for workplace equipment, conductive flooring is just as important as ESD-compliant workbenches and chairs. The most important measure is the proper grounding of personnel.

MAINTENANCE AND CLEANING

Grounding connections, mats and earthing plugs should be inspected on a weekly basis and wrist bands every day. Special detergents must be used when cleaning them as conventional household products may leave behind an insulating coating.

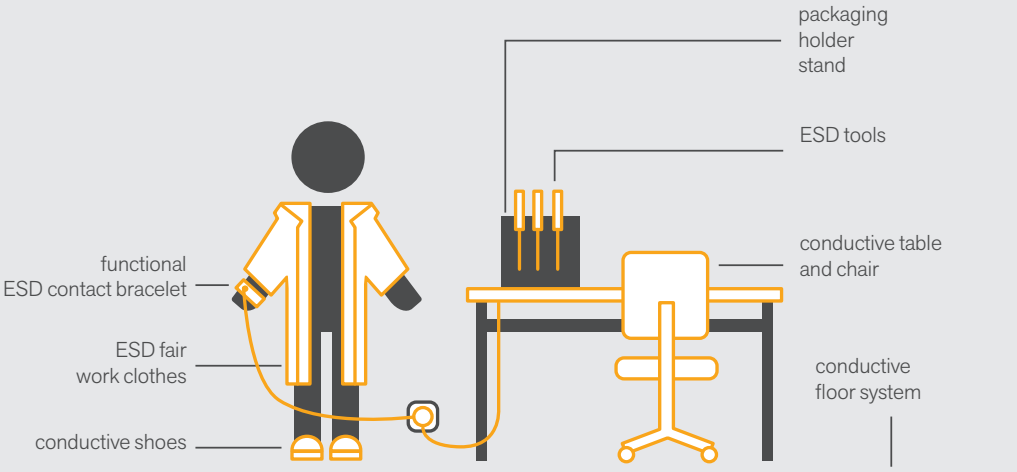


STATIONARY WORKPLACE - WORKING IN THE EPA AREA

An ESD-safe workplace is indispensable in order to safely and properly carry out work and measurements on electrostatically sensitive components.

In fixed installations, such as in EPAs (**E**lectrostatic discharge **P**rotected **A**reas), all elements that come into contact with people and components should be electrostatically conductive.

Foot mats, workplace pads, large assemblies and personnel grounding are earthed by so-called earth bonding plugs, while it is important to pay attention to ESD logos for clothing and tools.



ESD SAFE EXECUTION OF A WORKSTATION IN THE EPA AREA

EARTH VARIANTS AT THE EARTH PLUG

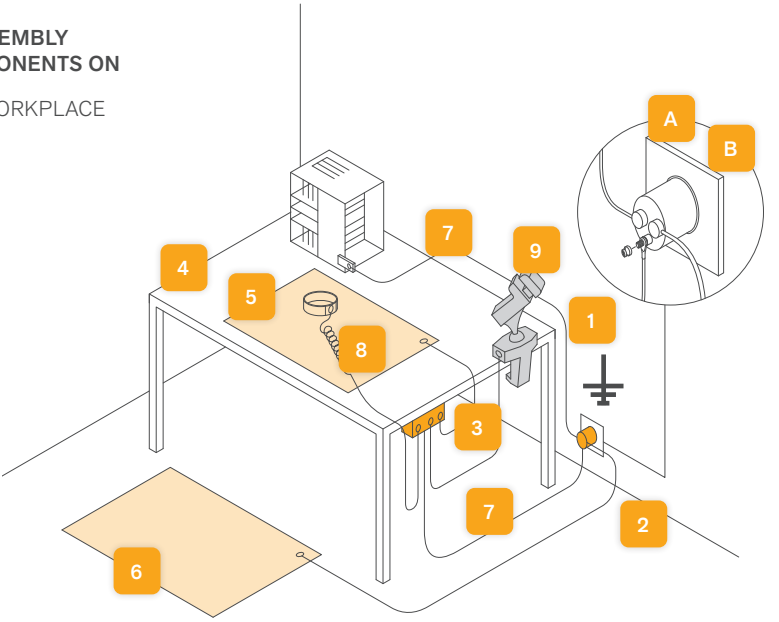
- **A** by thread
- **B** by button
- **C** by clip

Our workplace requirements can also be used as shelf supports

	COMPONENTS	MATCHING PRODUCTS FROM BERNSTEIN
1	grounding point	–
2	earthing	9-359-2 (for EU sockets) 9-353 (for clamping on metal)
3	earthing module	9-359-1 (for clamping on table)
4	workplace	–
5	working mat	9-354-100, 9-360-0, 9-361-0, 9-367-0, 2291, 2301, 9-334
6	floor mat	9-361-0, 9-367-0
7	earthing cables	9-343-1, 9-344-1
8	personnel grounding bracelet	9-341, 9-342
9	components and devices	9-205 ESD, 9-215 ESD, 9-251 ESD, 9-253 ESD, 9-261ESD

CORRECT ASSEMBLY
OF THE COMPONENTS ON

STATIONARY WORKPLACE



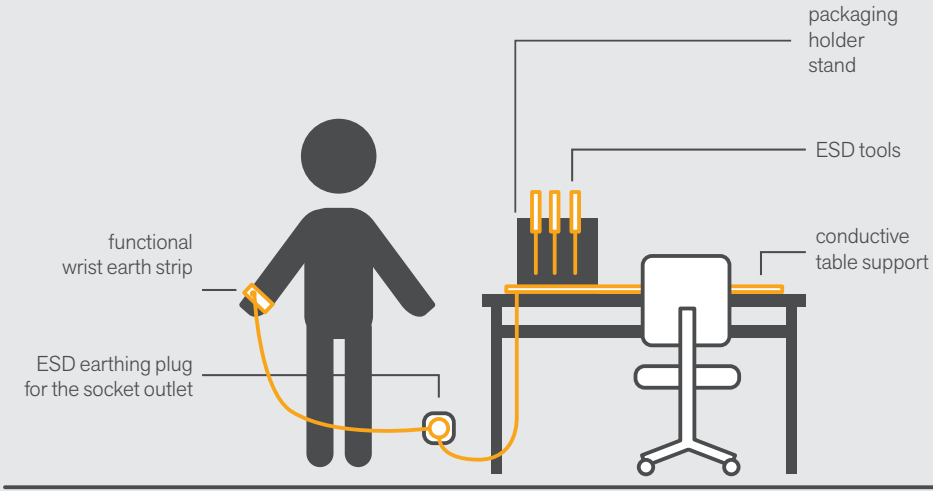
MOBILE WORKPLACE - WORKING ON THE ROAD

It does not happen often that fully assembled components or assemblies can be handled, repaired or serviced in ESD protected areas. This is where so-called ESD workplaces are needed.

The traditional mobile workplace (also called a handling set) consists of a workplace pad, a wrist band for grounding of personnel and an earthing cable with a earthing plug.

If there are no plug sockets available, the earthing cable can also be attached to grounded metal surfaces using a crocodile clip.

When properly set up, static electricity is discharged via the mat. But when using this method, it is important to make sure that the hand-to-earth resistance is less than 3.5×10^7 ohm.



SIMPLE DESIGN OF AN ESD SAFE WORKSTATION FOR MOBILE USE

EARTH VARIANTS AT THE EARTH PLUG

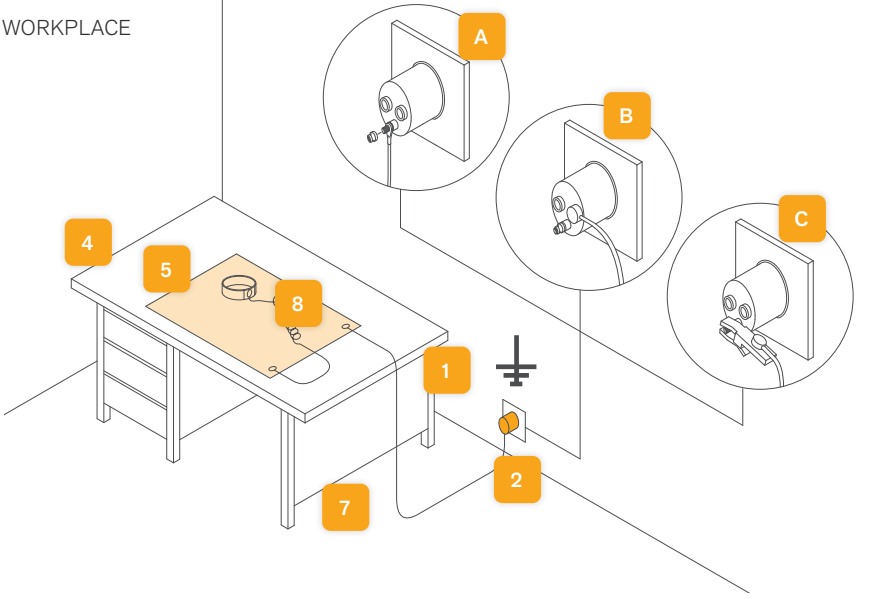
- **A** by thread
- **B** by button
- **C** by clip

Our workplace requirements can also be used as shelf supports

	COMPONENTS	RELATED PRODUCTS BY BERNSTEIN
1	grounding point	–
2	earthing	9-359-2 (for EU sockets) 9-353 (for clamping on metal)
3	earthing module	9-359-1 (for clamping on table)
4	workplace	–
5	working mat	9-354-100, 9-360-0, 9-361-0, 9-367-0, 2291, 2301, 9-334
6	floor mat	9-361-0, 9-367-0
7	earthing cables	9-343-1, 9-344-1
8	personnel grounding bracelet	9-341, 9-342
9	components and devices	9-205 ESD, 9-215 ESD, 9-251 ESD, 9-253 ESD, 9-261ESD

CORRECT ASSEMBLY
OF THE COMPONENTS ON

MOBILE WORKPLACE



PRODUCTS FROM BERNSTEIN - FOR GOOD AND SAFE WORK

Here you will find a wide range of ESD-compatible tools for use in ESD protected areas. Often, however, work must be carried out outside these protected areas where ESD-sensitive parts must be installed. Here too, we offer complete solutions that can be used on the move, such as table supports and earthing plugs for sockets, hand tools and clamping devices.

sales@bernstein-tools.de

Scan QR Code to get to the ESD product range!

IMPORTANT!

All our ESD bags are provided with conductive velcro tape

for German version turn around

www.bernstein-werkzeuge.de