General information ESD Measurement

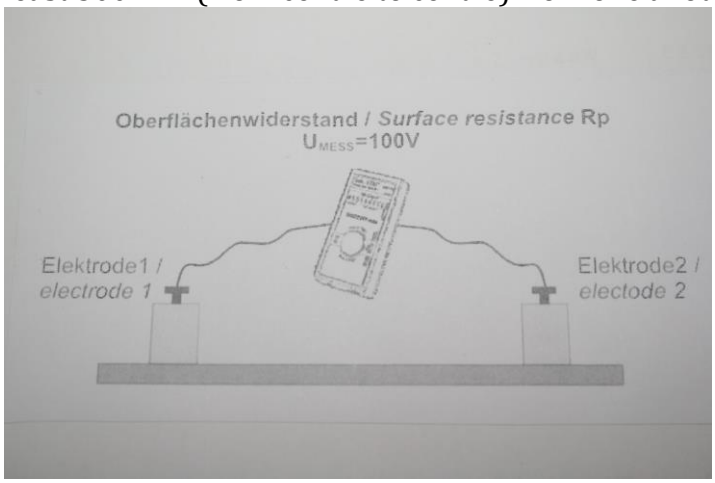
Pre-conditions for Measuring Instrument:
Measurement voltage: 10 V for $<10^6\ \Omega$
100 V for $10^6 - 10^{11}\ \Omega$
500 V for $>10^{11}\ \Omega$

Measurement:
Connect the measuring electrodes with the measuring instrument.
Clean the measuring electrodes with a fluff-free cloth. Do not use ethanol or isopropanol to clean the electrodes.

Begin with a voltage of 10 V and read off the measured value after 15 seconds, or when the display has come to a standstill. If the value exceeds $10^6\Omega$, or ol is shown, select 100 V and repeat the measurement. If the value exceeds $10^{11}\Omega$, or ol is shown, select 500 V and repeat the measurement.
If ur is shown, then switch over to the respective lower measurement voltage.
Measurement is started by activating the "Start/Enter" button.

23°C 12% air humidity 48 h conditioning (in accordance with DIN for the test certificates, not possible in the building, due to higher humidity)
Therefore the temperature and the humidity of the laid floor covering must always be noted.

Distance between electrodes for surface resistance (point to point): both measuring electrodes are connected to the measuring instrument and placed on the floor at a distance of at least 300 mm (from centre to centre) from one another.



Measuring the resistance to earth (conductive resistance): one measuring electrode is placed on the surface of the floor and connected to the measuring instrument. The second cable of the measuring instrument is connected to the earth of the building. The central point of the

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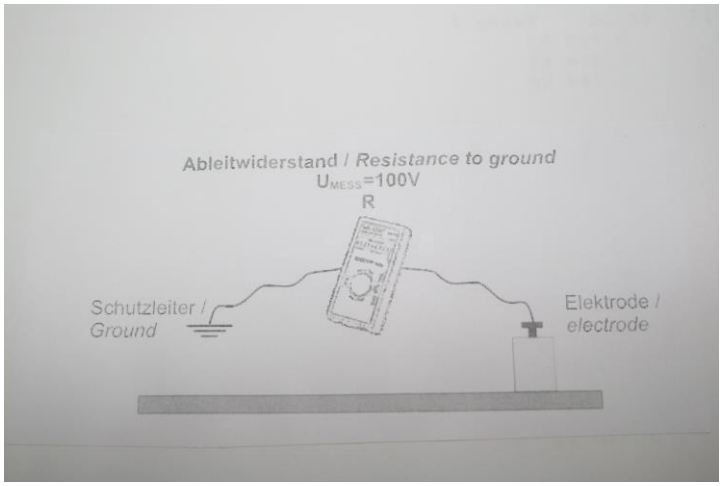
measuring electrode must not be nearer than 10 cm from the edge of the test area (wall of the room).
When testing on laid floors the number of measurements must be chosen so that they are representative for the floor in question - however, at least six measurements must always be carried out-.



Person measurement footwear/floor
Clean shoes with ethanol, wear the shoes for at least 10 min. beforehand.
Connect one electrode to the earth, the other to the measurement line of the hand-electrode, keep both feet on the floor and hold the hand-electrode firmly.
Thereafter repeat the measurements, whereby one measurement must be made with only the left foot and once with only the right foot.on the floor.

Choose 5 different places in the room to carry out the measurements.

Walking charge:
Set up Walking-Tester
Walk 2 steps per second. Walk forwards and backwards, avoid turns and friction.
0.5 m distance from the wall of the room.
Measure until the voltage no longer rises, or after 60 seconds have elapsed.
Attention: For the walking charge and person measurement ESD-shoes are required and a different measuring instrument. This is only required in real ESD-areas and is

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carried out by an ESD-coordinator on site.

Weight of the cylindrical electrodes:
approx. 2,5 kg ± 0,25 kg for measurements on hard, unyielding surfaces or
approx. 5 kg ± 0,25 kg for measurements on all other surfaces (e.g. linoleum)

Linoleum is, in contrast to PVC, rubber or poured thick-film systems (e.g. epoxy), difficult to measure. In the surface of the linoleum there are further special additives which build up conductivity. A linoleum must acclimatize for a few days after being rolled out, in order to achieve measured values below the regulatory limits.

If resilient floor covering is measured when laid as tiles, then the measuring electrodes are to be so arranged that they do not touch any connecting places (sealed joints) which join the tiles together.

Test protocol:

- Referral to the international norm: DIN EN 61340-4-1
- All necessary details for the complete identification of the measuring site
- Date of measurements
- Test climate: temperature and relative air humidity during test
- Details such as possible cleaning or subsequent procedures
- Type of measurement: surface resistance, resistance to earth (conductive resistance)
- Voltage applied

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ESD Equipment	Testing intervals	Comments
Floor	Annually, recommended half-yearly	Possibly in winter and in summer, in order to determine dependence on humidity.

ESD Measures	Specification Product testing	
Person-footwear-floor-system	DIN EN 61340-4-5	R_g<3,5x10^{7}Ω or R_g<1x10^{9}Ω and body charge <100V
Floor	DIN EN 61340-4-1	R_{gp}<1x10^{9}Ω

The norm requires the development of an ESD-control-program and a related plan from every company which has ESD-areas. Administrative as well as technical measures must be recorded in this plan. As a rule, an ESD-coordinator is requested for this purpose.
As a matter of principle the initial test of all ESD control measures must be carried out before any start-up operation and then regular controls and checks must follow.

ESD-areas: adjoining areas, only for trained personnel in the manufacturing of electronic components, etc. Here there is always an ESD-coordinator.
Here an acceptance measurement must be carried out after coating, without exception.

Medical practices, hospitals do not officially count as ESD-areas. Here conductive floor coverings are required and must be externally tested every 4 years.
Important: otherwise measurements after coating must only be carried out if this is specifically required in the terms of tender.

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