

## Is an aesthetic upgrade of an existing ESD cast floor possible?

### In the end a MIJtech ESD-QuickScan offers clarity

MIJtech for advice and expertise on synthetic floors.

Advice, based on more than 25 years of experience in the rules and regulations, the technology and the knowledge of material of all synthetic floors, including epoxy, polyurethane and trowelled floors.

MIJtech among other things works for consultancies, expert bureaus, private persons, contractors, cast floor firms, (heavy) industry, commercial and industrial building, owner-occupier's associations, the government and the project sector, such as health care institutions and schools.

MIJtech develops and offers training, seminars and participates in scientific research.

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Recently MIJtech kunststof-vloeradvies received a request by one of the biggest electronics manufacturers to evaluate an existing ESD floor. The client's own measurements show resistance values falling outside the specifications. There are doubts as to the proper functioning of the floor. A second opinion is more than welcome!

#### The course of this case

The floor is in need of an aesthetic upgrade. Through the private contractor the flooring company is approached for an upgrade of the existing ESD cast floor. The flooring company seeks advice from one of its suppliers and applies a product that according to the product sheet should be appropriate for the application, however only if applied within a complete floor system. This application however was *not* a complete system. The upgrade merely consists of a thin, shiny, fibrous EP sealing. The existing ESD cast floor is being repaired here and there and the existing lineation is removed. The whole is then degreased and polished.

This upgrade proves to be insufficient. The thin sealing floor is inadequate to make the floor flat and tight again. All polished parts and carried-out repairs are still showing more or less. Apart from that, rolling lines and joins are visible.



Vertical resistance value to ground.

#### Measurements bring certainty

Then MIJtech is invited to present an independent advice. First of all MIJtech carries out ESD measurements of the partly still present old ESD cast floor. This proves to meet the criteria of *vertical resistance value* to the ground NEN-EN 1081 and of *tension buildup*, measured in conformity with the *HBM-walking test* NEN-EN IEC 61340-4-5. Consequently MIJtech carries out measurements of the upgraded floor, i.e. the existing floor including the new top layer. The resistance value to ground proves to be quite high and falls outside the client's specifications. Moreover, it also proves not to meet the criterium of tension buildup, measured with the HBM walking test, which really is the crucial test for the components, but which was not prescribed by the client for the construction of the cast floor.

Fortunately there are also samples present of the applied new top layer, applied in the system as prescribed by the manufacturer. MIJtech also measured these samples. The outcome? The resistance value to ground is too low and falls outside the specifications! Even now that the product was applied in the system as advised by the manufacturer, it does not meet the specifications for ESD floors. (Apart from that, the system did meet the value mentioned in the technical product sheet: resistance to ground  $< 10^6 \Omega$ .)

Continuation: p.t.o.

### Directive advice

These observations are recorded and apart from that, MIJtech carries out supplementary measurements in order to present a directive advice for the upgrading of the floors. Special system samples are laid on the floors and the resistance hereof to ground and the HBM walking test are measured.

A one or two-layered silky gloss PU system turns out to meet the HBM walking test everywhere. It only generates a tension build-up of less than 15 V, where 100 V are allowed. The resistance to ground (measurements vary from 1 to 5 G $\Omega$ ) however is too high in some places according to the specification of the client. But as the HBM walking test comes up with an excellent value, the high resistance to ground is not of importance to MIJtech. For the focus is on a tension build-up that is as low as possible.

For this floor an upgrade is possible from an ESD technical point of view, although not all underground disturbances can be remedied. Nevertheless this existing ESD cast floor can be upgraded in this project, both optically and ESD-technically. For this purpose a directive advice with a number of varieties was formulated for this project.

### Occupational safety

When persons in a room are exposed to direct or indirect sources of tension, the intensity of the current flowing through these persons is to remain limited in order to prevent permanent damage or even a fatal outcome. In order to guarantee this personal safety ESD floors are to possess a resistance of at least 50 k $\Omega$  (in conformity with NEN-EN 1010, NEN-EN 1081). The higher the resistance, the lower the intensity of the current flowing through a person. For personal safety a higher resistance of 1 M $\Omega$  or 1 G $\Omega$  is preferable.

Current and tension will only flow toward the ground, when the floor is attached to the ground. For a guaranteed long-lasting effect, ESD floors therefore always are to be connected with a ground point. This may be a ground point of an electrical installation or a physically present ground anchor. The isolation resistance of the floor is the total resistance of the floor surface to the ground point. From the point of view of personal safety this value may never be lower than 50 k $\Omega$ . A positive deviation from this value is possible for tension sources with higher voltages (>380 Volt) and higher frequencies (>50 Hz). Within this framework -of the safety aspect- no upper limit applies.

### Safety for products and components

Electrostatic discharges may (latently) damage sensitive electronic components. In order to prevent this, an ESD environment, in which no static electricity is generated, is ideal. This static electricity may be measured with the HBM walking test in conformity with NEN-EN IEC 61340-4-5.

A test subject with ESD footwear walks on the floor and as a result generates electrostatic charging. This is measured and recorded. The ESD standard NEN-EN IEC 61340-4-5 indicates 100 V as the maximum tension build-up. MIJtech has already carried out measurements of ESD systems that generate less than 15 V. Even at a very low relative humidity.

### ESD technical specification

On the basis of the above an ESD technical specification might be: Maximum tension build-up < 15 V, NEN-EN IEC 61340-4-5. Minimum resistance to ground 50 k $\Omega$ , NEN-EN 1010, NEN-EN 1081.

### Conclusion

MIJtech, in cooperation with its partners, has realized many product developments. In combination with our ample experience in measuring ESD floors we reach the following conclusions:

1. Measuring the surface resistance of the floor does not provide any information on the functioning of the floor.
2. Measurement of the floor's resistance to ground provides information on the safety of the floor for human beings.
3. Measuring the floor's resistance to ground provides no information on a possible tension build-up of the floor.
4. In the end measurement of the static electricity with the HBM walking test indicates what is important from an ESD technical point of view: working safely for the products and components.