ICDLI

International Committee of the Decorative Laminates Industry

Technical Leaflet

Electrical properties of High Pressure Laminate (HPL)

November, 2009

ELECTRICAL PROPERTIES OF HPL

Contents

1. General

1.1 Scope

The following usage recommendations apply to those materials described as High Pressure Laminates (HPL) corresponding to EN 438 and ISO 4586 intended for use in areas where the ability to discharge surface static on their intrinsic antistatic properties* would be essential requirement.

* Antistatic is a generic term, without any requirements.

1.2 Electrostatic

The behaviour of materials in respect of their ability to conduct electrostatic charges may be drawn on an empirical scale based on electrical resistance in Ohms (Ω) (Fig. 1)

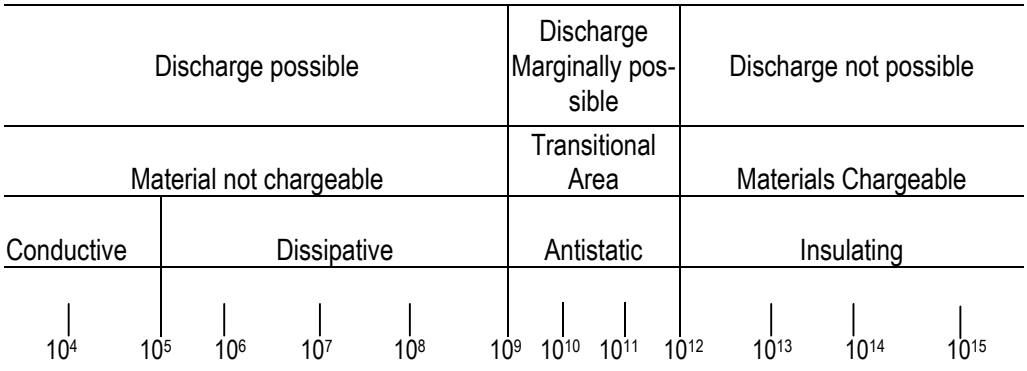

Fig.1:Surface Resistance Ro in Ω

Between the conductive (10^5 Ohm) and the insulative materials (10^{12} Ohms) there are material groups which will be suitable for a particular usage area, One can therefore distinguish between antistatic materials (10^9 to 10^{12} Ohms) and **dissipative materials** 10^5 to 10^9 Ohm).

The lower limit value of 10^5 is based on safety reasons. It is laid down for example from VDE-100, 5×10^4 Ohm when working with charges up to 100V and minimum 1×10^5 with charges up to 1000V.
It is indeed possible for electrostatic charges to be induced into antistatic materials but these are short lived and not allowed to accumulate.

With dissipative materials it is possible for electrostatic charges to be dispersed by providing means of earthing. The evacuation of induced charge will be dependent of the amount of charge and the resistance offered by earthing.

1.3 Electrostatic phenomena

Most electrostatic charges are generated by the contact variations between two materials and they increase when the materials differ and when the contact variations are accelerated. Eg: by friction (Triboelectricity)

For example by rubbing of clothing to produce a charge of several thousand volts.

The prevention of electrostatic discharges (ESD) can be carried out as follows:

a) The build-up of electrical discharges will be influenced by:

- The level of the ambient relative humidity
- An ionization of the air
- The choice of materials eg for clothing or footwear

b) The speed of dispersion of electrical charges is affected by the resistance of the dissipative materials and the efficiency of its connections.

c) The accumulation of charges will be affected by the use of antistatic material which prevent the local build-up caused by increasing differences in the potential.

THIS FUNCTION IS FULLFILLED BY HPL.

2. Electrical properties of HPL

The more conductive a material is, the shorter the electrostatic discharge time and therefore the higher the momentary energy (leading to the formation of sparks). The discharge from antistatic materials last a few seconds(discharge times – para 4.2.).

This is advantageous for the decay of energy.
HPL's are in this respect like antistatic materials and therefore need not be earthed. Their surface resistance lies between 10^5 and 10^{12} Ohm. The classification of these values depends on various factors, such as:

a) From the surrounding climatic conditions, especially those of low relative humidity. Laminates which are essentially made of cellulosic materials cannot remain uninfluenced by moisture. They eventually attain equilibrium with their surrounding.
For example HPL at room temperature may possess a surface resistance of 10^5 Ohm at 60% RH but 10^{11} Ohm at 20% RH.

b)The formulation of HPL by the manufacturer in producing the various laminate types. The following factors exercise an influence.
Colour or Pigment, Mineral fillers in the build up of each sheet
Chemical composition of additives to the thermosetting resins.

Appendix 1 . Illustrates the range of electrical resistance for different surfacing materials.

3. Application fields of HPL

a)HPL as an antistatic material can offer unearthed, an excellent protection against electrostatic charges in application such as:

Living room and Kitchen furniture
Doors
Flooring
Food preparation areas
Restaurants
Transport and vehicles industry

b)Because of their excellent mechanical properties and chemical resistance capabilities, together with their antistatic qualities, HPLs are suitable where the prevention of static build up is an essential requirement, e.g:

- Office and computer room furniture
- Laboratory furniture and equipment
- Clean rooms
- Health establishments (Hospital, Pharmacies)
- Optical industry
- Music recording industry

c)The dissipative materials provide, when earthed, higher security for special usage areas (electronic worktops, tables for special usage areas and clean rooms) where the high requirements demand special protection from static build up. Application fields demanding more specific ESD protection. (eg: Computer room flooring and equipment) conductive material with electrical resistance below 10^9 Ohm should be used and must be connected to earth. Special dissipative HPL's are on offer with superior dispersion qualities, It is therefore recommended that discussions are made with the producer.

4. Testmethods and mesaurement of resistance and discharge capacity of materials

4.1 The resistance (R) for sheet materials such as HPL can be measured as follows:

On the surface between two electrodes to determine surface resistance Ro.

Through the thickness between two electrodes (one on each face) to determine volumic resistance or transversal resistance Rv. These test methods differ and require the following to be taken into account:

Am object's electrical restistance to earth potential, often referred to as earth, should be taken t o be its bleeder resistance RA/resistance to earth RE.

Users should always contact the manufacturers. We recommend the use of the test methods described in IEC 61340 ff.

Discharge time from the material is measured in accordance with Standard IEC 613402-1.

Measurement of electrostatic charge on persons should be conducted in accordance with IEC 61340-4-5 Edition 11.

5. Official test houses for the measurements of electrical properties

The following are members of the European "Sprint Association".

Germany:
VDE, Offenbach (www.vde.com)
TÜV, Stuttgart (www.tuev-sued.de)
B.E. Stat. Dresden (www.bestat-cc.com)
IHD, Dresden (www.ihd-dresden.de)

UK
ERA Technology, Leatherhead
Chilworth Technology Ltd. Southampton

France
LCIE, Fontenay – aux – Roses

Italy
Universita di Genova, Genoa

Spain
Laboratorio Oficial, J.M. Madariaga, Madrid

Standards:

DIN EN 61340-2-3
DIN EN 61340-4-1 Edition 2
DIN EN 1081
DIN EN 61340-5-1
DIN EN 61340-5-2

This document makes no claim of completion in respect of the listing of the full details of standards referred to in the text.

All information is based on the current state of technical knowledge, but it does not constitute any form of liability. It is the personal responsibility of the user of the products described in this information leaflet to comply with the appropriate laws and regulations.

International Committee of the Decorative Laminates Industry (ICDLI)

For more than 40 years the ICDLI is the international representation of the interests of the European laminates manufacturers. Further information about the ICDLI and the data sheets published up to now can be found at www.icdli.com and www.pro-kunststoff.de
This application was compiled by the International Committee of the Decorative Laminates Industry.
It considers the conditions of application technology in the European countries.
If you have further questions, please contact us:

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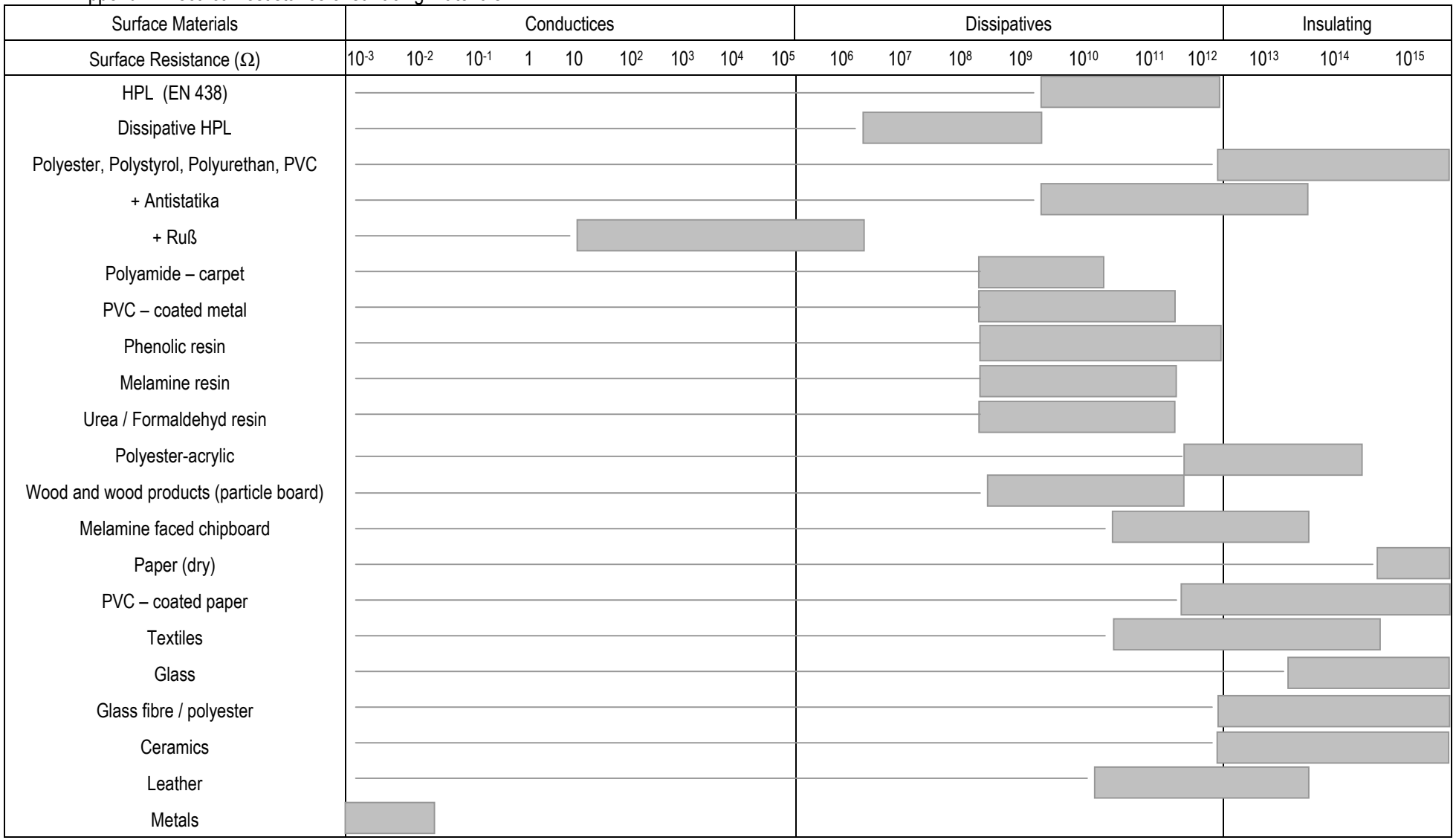
Appendix: Electrical restistance of surfacing materials



All information provided applies to a broad range of products generelly available commercially. Special measurements will need to be undertaken for particular application requirements.