

The use of electrostatic powder coating is expanding. In view of the dust explosion hazard related to this process, a comprehensive investigation of ignitability and explosibility properties of 11 polyester/epoxy resin powders used in electrostatic powder coating has been carried out. The powders differed with respect to the ratio of polyester to epoxy, pigment type, pigment content, density and particle size distribution.

The powders were tested in the closed Hartmann bomb for establishing the maximum explosion pressure and the maximum rate of pressure rise, in the open Hartmann tube fitted with the CMI electric spark generator for measurement of the minimum ignition energy, and in the "Nordtest Fire 011" apparatus for determination of the minimum explosible dust concentration. Attempts were also made at conducting some explosibility tests in the Swiss closed 20 litres spherical vessel, but severe blocking problems in the dust dispersion system were encountered. Particle size distributions of the powders were determined using a laser diffraction method, and the specific surface areas were measured by nitrogen adsorption.

All the powders gave approximately the same maximum explosion pressures in the Hartmann bomb, where as the maximum rate of pressure rise decreased with increasing pigment content and particle size. Clouds in air of all the resins had quite low minimum ignition energies, from below 3 mJ to approximately 20 mJ. Except for one or two powders the minimum ignition energy increased fairly systematically with particle size. There was no systematic influence of the pigment content, although the powders with the highest pigment contents also had the highest minimum ignition energies.

The minimum explosive dust concentration increased systematically with increasing pigment content, in such way that the concentration of combustible material at the minimum explosible dust concentration was nearly the same for all the dusts, and close to the minimum explosible concentration was nearly the same for all the dusts, and close to the minimum explosible concentration of gaseous hydrocarbons like methane and propane.