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Information about thermoset powder coating & explosion hazards

Explosion limits:

- Lower explosion limit: **20-40g/m³**, depending on the organic material content
  e.g. difference between a transparent topcoat and a RAL 9016 (50% of this value is considered safe: **10g/m³**)
- Upper explosion limit: approx. **5 kg/m³**

Ignition temperature of mixture:

- **Above 400°C**
- 2/3 of this value is considered safe: **270°C**

Minimum ignition energy (MIE)

- Depends mainly on the concentration of the powder: concentrations of 500-1000g/m³ are most sensitive
- Depends to a lesser extent on particle size, organic content of the powder, and temperature
- On average 100 times higher than the energy required to ignite a solvent-air mixture
- Transparent powders: ignition with 'inductance': **min. 1 mJ.**
- Transparent powders: ignition without 'inductance': **min. 5 mJ**
- Polyester powders with 6% aluminium pigment: **min. 2 mJ** (with or without 'inductance')

Max. explosion pressure and K_{St} value:

- Max. explosion pressure for powders with a d_{50} = 30µm: **8.3 bar**
- Max. K_{St} value for d_{50}=30µm: **150 bar.m.s^{-1}**, this falls under dust explosion category **St 1** (even for coatings containing up to 5% aluminium pigment, the max. K_{St} value of 172 bar.m.s^{-1} remains within category St 1)

Remark:

Tests conducted in experimental test chambers (commissioned by Ciba-Geigy) have shown that at powder concentrations significantly higher than those normally used in powder application, in the event of ignition of the powder cloud from a single spray gun (the ignition source must be brought relatively close to the gun!), there is no transfer to other spray guns. The powder dust present on the floor of the booth does not ignite either but tends to melt due to the heat.

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