



Fig. Design of the measurement sections

Method for measuring the electrostatic charge in flows

The new technology is based on two-dimensional measurements using particle image velocimetry (PIV). An electrostatic field is applied to a test duct between two measurement sections. This field deflects the particles differently depending on their charge. By observing the dynamics of the individual particles in the measurement sections, this new technique measures the change in charge in the flow direction. Contrary to established methods, the new technique gives the spatially resolved charge, not only the absolute. Further, this new technique makes measuring the electrostatic charge of laminar and turbulent flows of powder and liquids possible. The measurement is online and non-invasively. And so, this new measurement method helps to improve the safety of many transport processes.

Advantages

- Spatially resolved measurement of the electrostatic charge in flows
- Non-invasive measurement
- Extended range of application for turbulent flows
- Suitable for powder and liquids

From an explosion protection point of view, it is essential to understand precisely how powder or liquids charge during transport in industrial plants. During the pneumatic transport of powders, individual particles can become electrostatically charged. Due to the triboelectric effect, this electrostatic charging of flows can trigger explosions. However, conventional measurements using a Faraday cage can only measure the sum of the charge of all particles. The new PTB invention makes it possible to measure the charge of turbulent flows for the first time. In principle, the method is suitable for powder and liquid flows.

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3.51 Analysis and Simulation in Explosion Protection

Economic impact

The method is suitable for applications in all sectors that transport liquids or powders, for example in the pharmaceutical, food and mineral industry. In addition, future use is conceivable in companies whose products are based on the electrostatic charging of flows, such as triboelectric sorting or powder coating.

Development status

A German patent DE102021101409B3 has already been granted for the invention. Licenses for use are available.



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