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Development of a standardisable electrostatic charge-transfer electrode system with combustion gas correlation, including a test and evaluation method

Objective

The dissipative properties of base materials used for protective clothing can be assessed in accordance with standards (EN 1149-1, -3). However, there is currently no standardized assessment method available for the evaluating of complete clothing systems used in flammable and potentially explosive atmospheres. The CEN/TC162/WG1/PG2 standards working group was recently established at the European level. Its objective is to develop the EN 1149-4 standard for the assessment of complete dissipative protective clothing with regard to the risk of electrostatic ignition.

Approach and results

There are currently two methods with the potential to be integrated into the EN 1149-4: the Ignition Test method (developed by BTTG, UK) and the STFI method (Charge Transfer Garment Test). While the Ignition Test Method uses a highly explosive gas (hydrogen-air mixture) to detect ignition-effective discharges, the STFI method evaluates the ignition effectiveness of the transferred charge in a discharge. Based on these findings, the objective of the research project was to develop a standardizable charge-transfer electrode system with a fuel gas correlation for the detection of ignitable discharges in gas-vapor-air mixtures of explosion group IIC or higher and a minimum ignition energy of ≥0.016 mJ.

In addition, a suitable evaluation method was developed. With the currently available electrode version, a measurement accuracy for charge detection in the range of < ±2 nC can be specified. The results are integrated into the current standardization activities and they are being tested for different clothing designs and continuously refined.

Test rig (partial view) with the STFI electrostatic human model for testing the charge-transfer electrode system

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The final report on this project is available on request.

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